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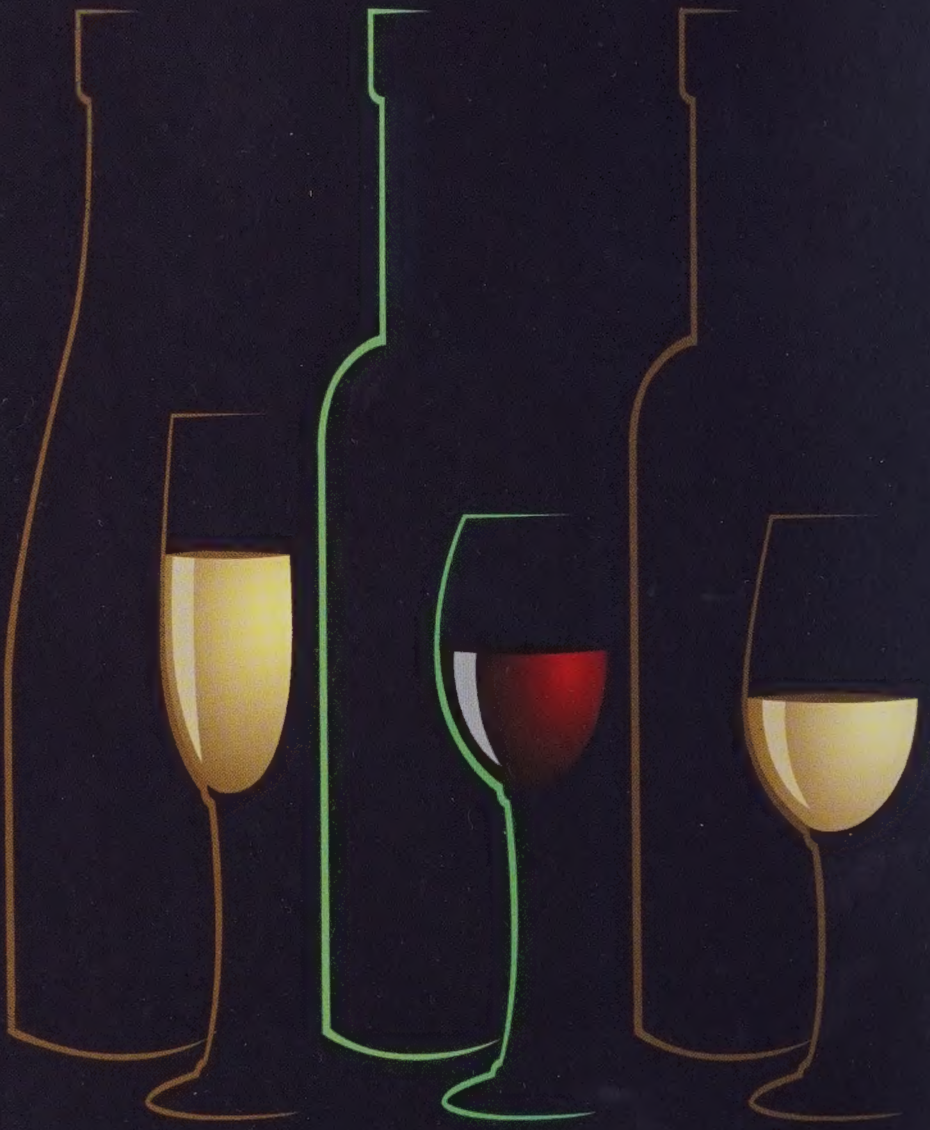

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Cover: Destemming/sorting and loading Cabernet Sauvignon grapes into open-head barrels in Sterling Vineyards Reserve winery (Calistoga, CA). Photo by Don Neel.

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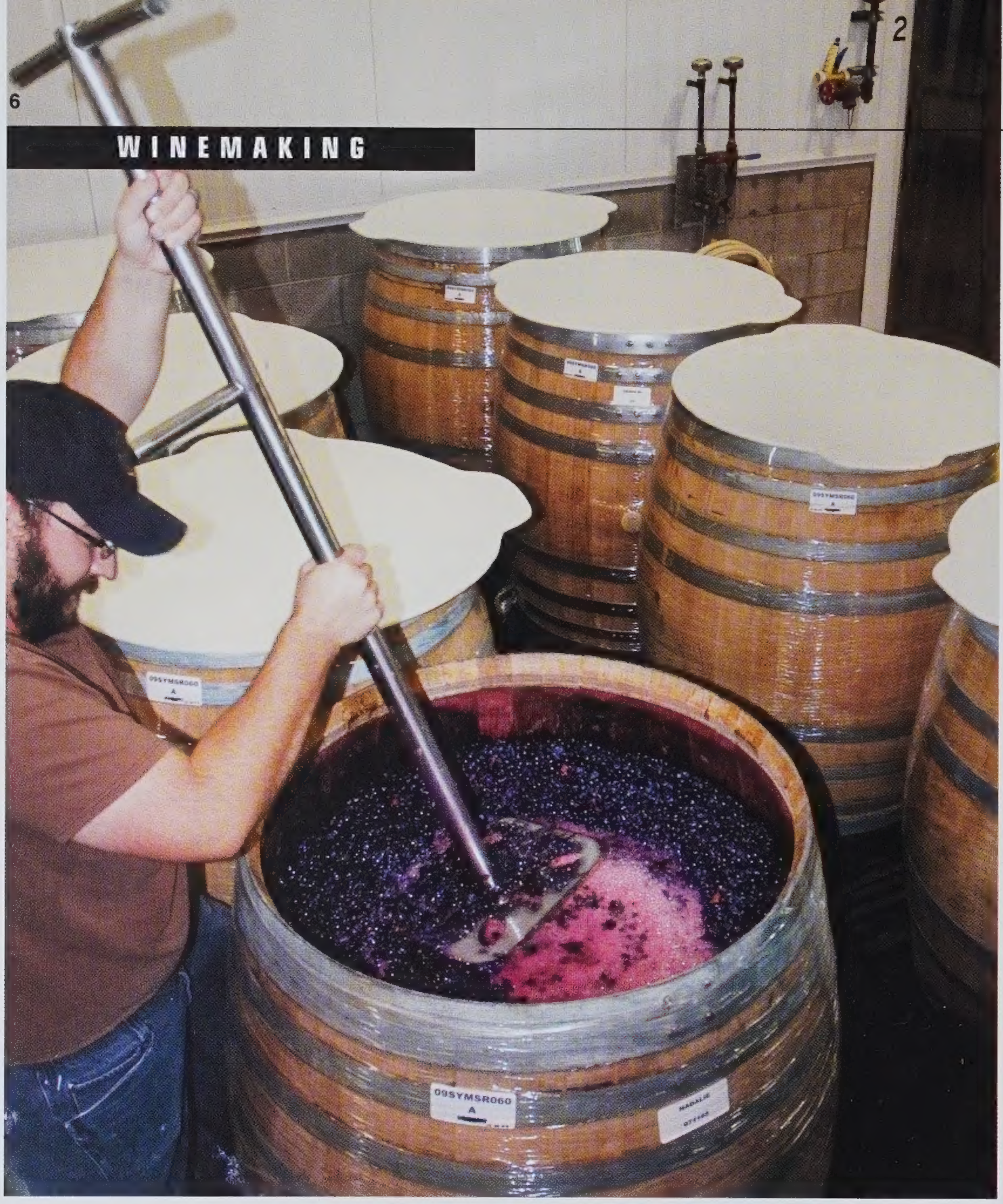

Michael Cruse, assistant winemaker, punches down cap of fermenting red must in puncheon at Merryvale/Starmont Winery.

FERMENTING red must in oak barrels

BY Linda Trotta

Winemakers who ferment red grapes in barrel tout the elegance, seamless oak integration, full mid-palate texture, and improved color that the technique imparts to their wines. While they are also quick to note how labor-intensive, cumbersome, and time-consuming the practice is, red barrel fermentation is gaining favor among producers in both small and large wineries.

Six winemakers explain how red barrel fermentation is used as a component of their winemaking programs:

Sanctuary

Fetzer Winery (Hopland, CA), first started fermenting small lots of red grapes in barrel in 1982. Since 1992, the winery has been barrel fermenting Pinot Noir grapes from Bien Nacido Vineyards (Santa Maria, CA) for a "Sanctuary" reserve program.

The 2008 bottling is 1,250 cases and includes 82% barrel-fermented wine. "We thought that the affect from fermenting Chardonnay in barrel would apply to Pinot Noir as well," explains winemaker Dennis Martin. "That is, controlled extraction of wood flavor into the wine which leads to fuller body and added complexity as a result of the interaction between yeast and oak."

Between 90 and 120 French oak barrels are utilized for fermentation each vintage (depending upon the volume of fruit harvested): 60% new and 40% second-fill, medium-plus toast from three different coopers. Barrels are filled and fermentation carried out with the barrel standing on end, one head removed.

The fruit is harvested into half-ton bins in the early morning and loaded into a refrigerated van for the one-day transport to the winery. Upon arrival at the winery, the bins are stored in a cool room overnight, and the grapes filled into barrels the following morning.

Each barrel receives one scoop of dry ice and 30 lbs of whole cluster fruit. The remaining fruit is then dumped onto a sorting table which feeds a Delta E2 de-stemmer with rollers removed. Whole berries (400 lbs) are then pumped into the barrels, to a fill-height of about one foot below the top.

Forty ppm of SO_2 is added to each barrel and then punched down to homogenize the addition. Each barrel is covered with a plastic liner held in place with a bungee cord. Inoculation with RC212 yeast occurs the next day, followed by a punch down to mix.

Fermentation temperature ranges from the mid to high 70°F, occasionally reaching the low 80°F, depending upon ambient temperature. Each barrel receives three punch-downs per day, tapering off to two, and then one per day as the fermentation completes.

At dryness, a conical stainless steel sieve is inserted through the cap and the wine is pumped out to tank. The cap is

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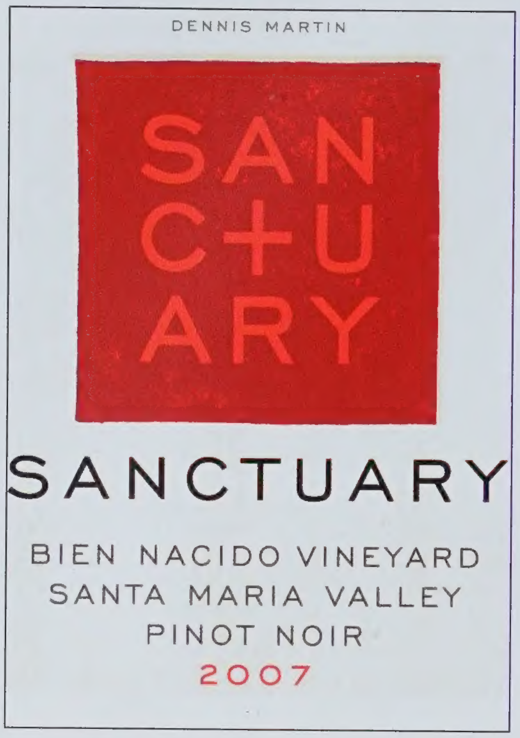
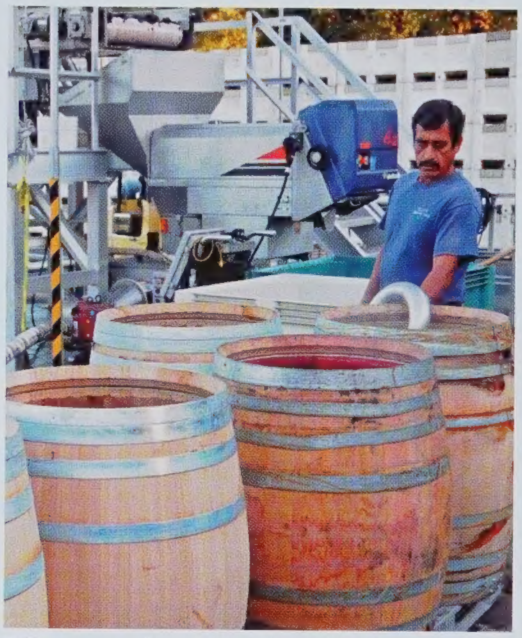


then dumped from the barrel into a Marzola basket press and the pressed wine is combined with the free run.

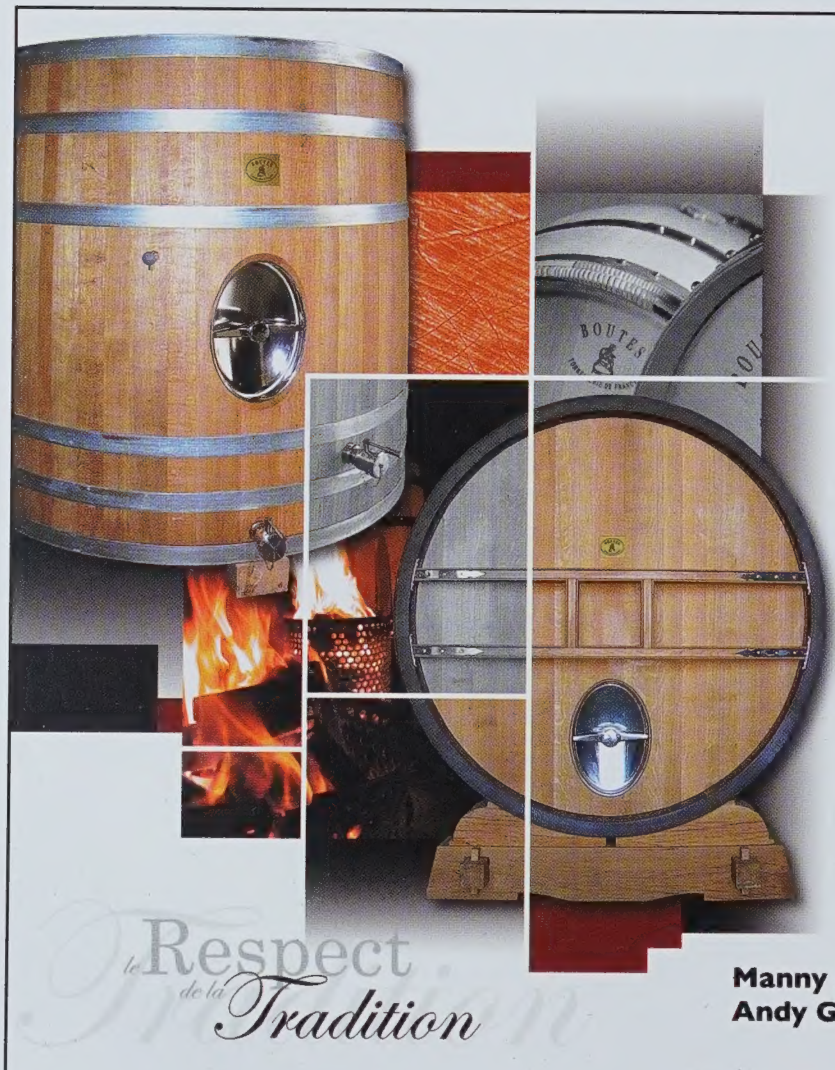


Filling open-head barrels with Bien Nacido Pinot Noir grapes at Fetzer Vineyards for Sanctuary brand.

Inoculation for malolactic fermentation (MLF) with Chris Hansen Viniflora LS culture occurs in tank, and after several days the wine is racked off its lees and put to barrel, where MLF completes. Included in this mix of ageing barrels (40% to 50% new oak) are fermentation barrels whose heads have been replaced. Lees stirring occurs early in the year following harvest, however once in barrel the wine is not racked until it is removed for blending. Once blended the wine sees a nominal 1.5µ Cuno filtration and then a 0.8µ Cuno membrane inline at bottling.

Beaulieu Vineyard

Beaulieu Vineyard [BV] (Rutherford, CA), began working with barrel fermentation of red grapes in 2006 as a component of the Georges de Latour (GDL) Private Reserve Cabernet Sauvignon blend (10,000 cases). In the first year, fruit was fermented in 100 open-top barrels (one head removed), utilizing punch-downs for cap mixing.



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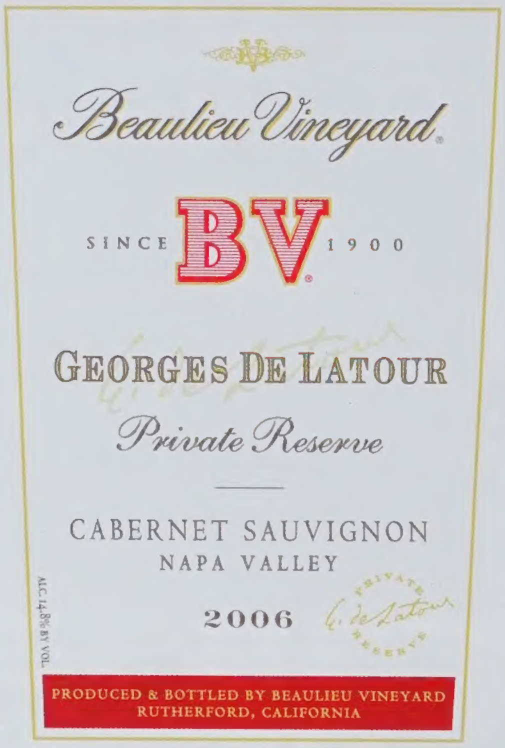
In 2007, the number of fermentation barrels increased to 300 and the fermentation method changed. The barrel head was removed for filling and then reinserted for fermentation, with the barrels spun in order to mix the cap. This method has been used since, with the number of barrels increasing in 2008 to a total of 650.

Winemaker Jeffrey Stambor ferments Cabernet Sauvignon and Petit Verdot in barrel and describes the key impact of this practice as "an almost seamless integration of fruit and oak in the wine."

BV has run analysis of the total phenol content of wines fermented in barrel compared to stainless steel tank. Stambor reports: "The analyses show a significantly higher amount of total phenols in barrel-fermented lots. However the perception of these wines on the palate is softer and smoother."

Roughly 40% of the fruit for GDL ferments in 60-gallon barrels, 50% in 2,000-gallon stainless steel tanks and 10% in 60-hectoliter upright oak casks.



The barrels are 100% new French oak with medium and medium-plus toast, sourced from 12 coopers.

The fruit is night-harvested, arriving to the winery in 30 lb boxes at 40° to 45°F. Processing, which occurs the same morning as harvest, consists of a Delta E1 destemmer and a P&L Specialties post-destemmer sorting system. Whole berries fall directly into the barrel, layered with dry ice. Barrels are filled to 400 lbs each and the heads reinserted. Lot sizes fermented in barrel range from 1 to 5 tons.

Stambor explains that re-inserting the head quickly and soundly is critical. "The dry ice creates quite a bit of CO_2 pressure inside the barrel. Workers must work swiftly to get the head in place so that the barrel can be laid on its side and the solid bung removed from the bung hole in order to ventilate. At the same time they must also be mindful of achieving proper installation to prevent leakage during fermentation."

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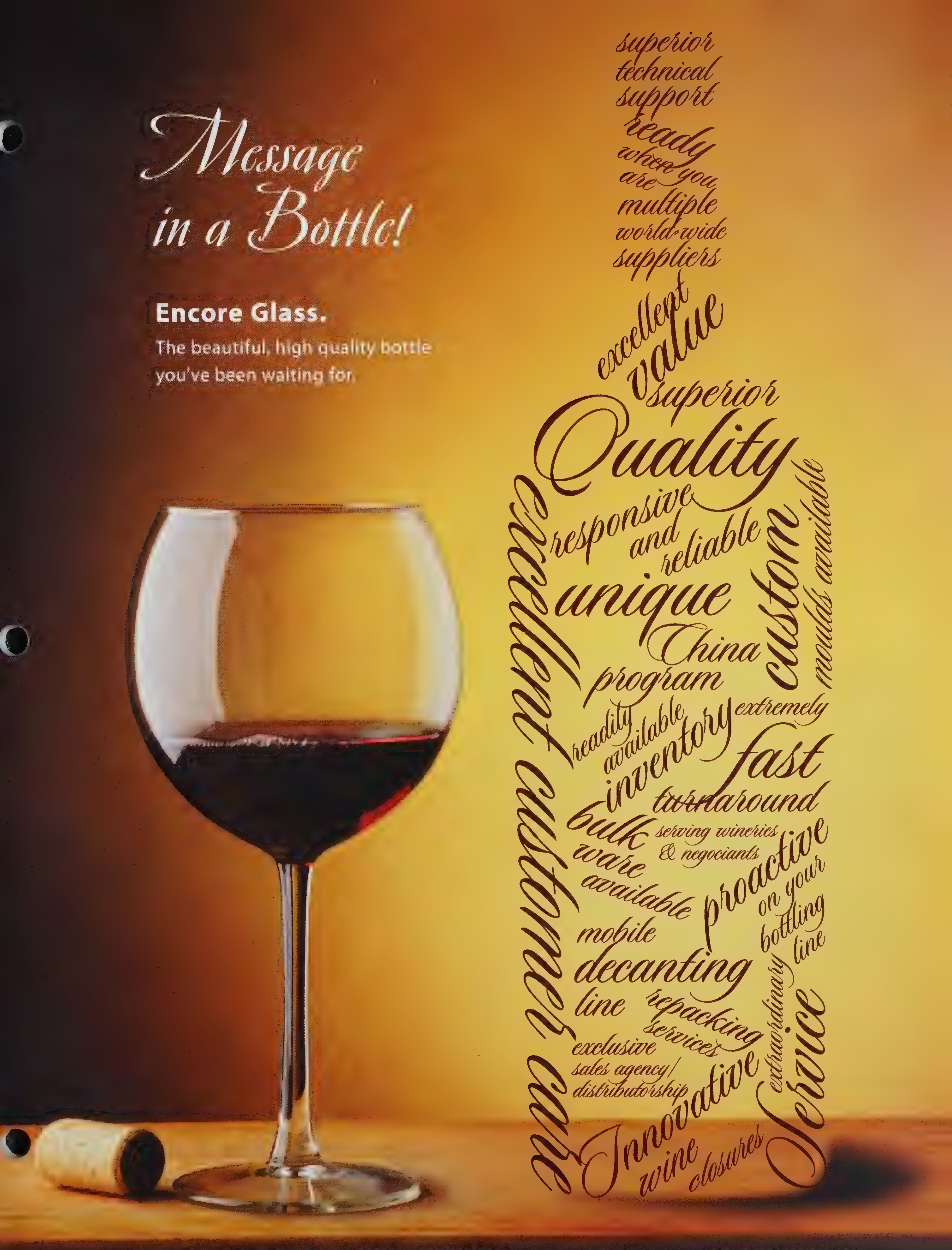

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Half of the barrels are lifted onto an OXO roller rack system (five-high), utilizing a custom lift attachment on a forklift. The remaining barrels sit on a wheeled rack system. Workers use a scissor-lift to access the barrels at the higher levels in order to spin them.

The must sees a three- to four-day cold soak before fermentation begins. Most lots are inoculated (three or four yeast strains were used in 2009) with a few fermented by native yeast. Available nitrogen is measured and adjusted as needed.

Peak fermentation temperatures reach 82° to 83°F, achieved by maintaining the room at 80°F. Total maceration time, which varies depending upon the fruit and vintage, can go as long as 50 days. With the exception of some barrels in 2008, MLF proceeds un-inoculated.

Fermentation bungs are used the entire time the must is in barrel. In 2008, these were replaced by solid bungs during barrel spinning; each time the bung came upright it could be vented. In 2009, locking bungs were used while the barrels were spun.

The number of barrel spins and times per day performed varies depending upon fruit make-up, vintage, and stage of fermentation. The maximum mixing that has been carried out is six spins (three in each direction), six times per day.

Stambor notes that attention to the speed of barrel spinning is important. Most lots include at least one barrel with a plexi-glass head so that movement of the cap can be monitored. He has observed that, early in the fermentation, if the barrel is spun too fast the cap merely moves with the liquid and so is not broken up and dispersed.

Before pressing, a screen-tube is inserted through the bung-hole, a wand is placed inside the tube and free run wine is moved to tank utilizing a Waukesha pump. Each barrel is taken down from the racks and stood on end for removal of the head to empty the skins into the cage of a Bucher-Vaslin JLB20 press. Up to five press cuts may be made, with free run and each cut barrel-aged separately.

The wines age for 24 months in the same 100% new French oak barrels utilized for fermentation. Racking during barrel ageing and fining is used sparingly as needed.

Sterling Vineyards

Sterling Vineyards (Calistoga, CA) now includes some barrel fermentation on vineyard lots designated for the Reserve Cabernet Sauvignon program (4,000 to 5,000 cases). Small scale barrel-ferment trials were conducted in 2006 and 2007. The technique was increased to a limited production level in the 2008 vintage, from which the final blend is projected to be nearly 20% barrel-fermented.

In 2009, barrel fermentation was expanded to a full production level of nearly 50 tons, using approximately 220 new French oak thin stave barrels, 80% medium-plus toast and 20% heavy toast.

Winemaker Mike Westrick credits the "full body, added texture, and softer tannins" that barrel fermentation brings to the wines for its rapid adoption into the reserve program.

Grapes are harvested in the early morning and arrive in the winery at a cool temperature in half-ton bins. The clusters are hand-sorted ahead of an Armbruster destemmer, after which the berries pass through a Vaucher-Beguet sorting system.

Barrels with one head removed are placed upright on a scale and filled with 400 lbs of whole berries. In a typical day, 20 to 30 barrels are filled (four tons per hour). The heads are reinserted and barrels placed horizontally on roller racks. Individual vineyard lots get split between barrel and stainless steel tank fermentation. For example, in a ten-ton lot, 8 tons goes to one stainless steel tank and 2 tons to 10 barrels.

The barrels are held in a 60°F room for a three- to four-day cold soak before inoculation. Each day, the barrels are rolled several times to mix the cap, once in the morning and once in late afternoon.

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Several different prepared yeast strains are used, with yeast nutrients added in two increments: the first follows yeast inoculation and the second at 20° to 18° Brix. The inoculated barrels are moved into an 85°F room for fermentation, where peak fermentation temperatures reach about 85°F. Fermentation bungs are used throughout maceration, replaced with locking bungs when the barrels are rolled.

The barrels receive four rolls twice per day during active fermentation, reducing to two rolls twice per day at about 5° Brix. Post-fermentation, the barrels are rolled twice every other day until draining and pressing.

Total maceration time typically lasts 45 to 50 days. Before pressing, a Waukesha pump is used to remove free run wine through the bung hole, utilizing a perforated wand. The barrel containing fermented skins is then lifted in a horizontal position over a bin and the head slowly loosened and removed. The grapes are raked into a bin which is dumped into a cage for the Bucher Vaslin basket press.

At pressing, tanks are dealt with separately from barrels. Most free fun lots are kept separate from press wine until blending. Exceptional press lots may be blended into free run wine right after pressing, but they are usually kept separate and evaluated after a few months in barrel.

After settling for one or two days the wines are racked off of the gross lees, inoculated with malolactic bacteria and then moved to barrels. MLF occurs in barrel for all potential reserve wines. Once MLF completes, the wine is racked off the lees, sulfur-adjusted, and returned to cleaned barrels.

The wine ages for about 18 months in 50% to 75% new French oak barrels. The blend is made during the spring and any fining is done about a month prior to bottling. The wine is filtered only if determined to be necessary.

Two-piece fermentation bung allows CO_2 evacuation during barrel fermentation.

Caldwell Vineyard

Caldwell Vineyard (Coombsville, Napa Valley) produces 3,500 cases of estate wines under two labels. The "Caldwell" label, totaling 1,500 cases, is made up of: "Platinum" — a limited

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production blend made of the best barrels from the vintage, produced only in select years; "Gold" — a 100% Cabernet Sauvignon blend; "Silver" — a proprietary Cabernet-based blend; and a Varietal Collection — small lot, individual pure clonal variety bottlings. All of these wines are 100% barrel-fermented in 80% new French oak barrels (225 L) and aged in 40% to 80% new French oak.

"Rocket Science" is a 2,000 case Syrah-based blend. Roughly ½ of this wine is barrel-fermented, in 80% new French oak. The other half (several Syrah clones) ferments in stainless steel tank. The bottled blend has been aged in 40% to 60% new French oak.

Caldwell Vineyard first conducted trials with red barrel fermentation in 2004 under the direction of then winemaker Phillippe Melka. In 2005, the percentage of barrel-fermented lots increased, with the Caldwell label bottling being 100% barrel-fermented. In 2006, the best lots from the estate were barrel-fermented and the Caldwell label bottling was 100% barrel-fermented.

Marbue Marke arrived at the winery as winemaker in spring of 2007. Starting with the 2007 vintage and going forward, Marke ferments all wines in barrel, with the exception of a portion of the Syrah, which ferments in stainless steel tank.

Fermentations occur in barrels from five coopers with various toast levels. One cooper, Tonnellerie Baron, supplies barrels equipped with a port and hatch on one head to allow filling, fermentation, and emptying of the barrel without removing the head. When using barrels from the other four coopers, the head is removed for filling and reinserted for fermentation.

Lots fermented in barrel range in size from ½ ton to 4 tons. The fruit is harvested in early morning, arriving to the winery at a cool temperature. It is destemmed, hand-sorted, and may or may not be lightly crushed depending upon condition of the skins. The berries fall directly into the barrel and dry ice is added. The barrels are placed in a cool room for a 2- to 3-day cold soak at about 55°F. Additional dry ice is added as needed to protect the must.

The fermentation room is held at 70°F, aiming for peak fermentation to reach 90°F. Both inoculated and native yeast fermentations are utilized. Available nitrogen levels are measured and adjusted as needed. Primary fermentations typically complete in 30 to 40 days. Average skin contact time is 60 days, with some lots going as long as 90 days.

Barrels selected for longer than 60-day maceration are topped at or near dryness. Fermentation bungs are used during primary and early secondary fermentations, replaced by locking bungs while the barrels are spun. MLF is carried out by native bacteria, sometimes starting during the extended maceration period.

OXO racks are used to hold the fermenting barrels. Depending upon the timing of fermentation and character of the fruit, barrels are spun in one to five rotation sequences in a 24-hour period. In each sequence, the barrel is spun anywhere from 3 to 10 times in each direction.

At pressing, the barrel head or hatch is removed and the entire contents poured into a screened sump. Free run wine drains through the screen and is pumped to a tank. The skins are transferred to a JLB basket press. The skins from different lots can be pressed individually or combined. The press wine fraction is aged separate from free run.

Barrel ageing lasts for up to 20 months. Upon completion of MLF, Marke racks the wines off of their lees. He typically racks at least once more before blending. The need for additional rackings is based on grape variety and evaluation of the wine.

On filtration Marke states, "We have not needed to filter or fine our wines based on stability. However, Rocket Science is filtered before bottling as it is our largest lot that goes to into distribution."

Marke describes the wines fermented in barrel as being softer and fuller sooner after fermentation as compared to stainless steel tank fermented wines; which he surmises

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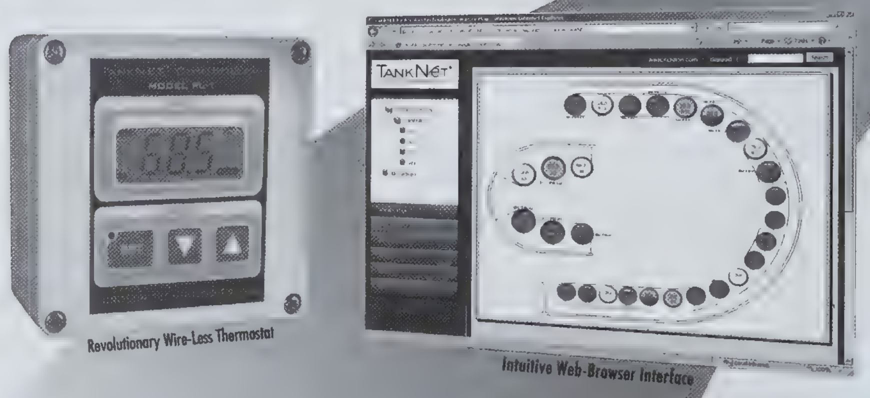
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could be attributed to slower extraction in the post-peak fermentation period in barrels.

Dana Estates

Dana Estates (Rutherford, CA) produces three vineyard designate Cabernet Sauvignon bottlings that combine for a total of 700 cases. In each bottling, barrel fermentation comprises all or a portion of the final blend; with fermentation strategies tailored to maximize the expression of each site. Working with consulting winemaker Phillipe Melka, Director of Production Cameron Vawter has been conducting barrel fermentations at Dana Estates since the winery's first vintage in 2005.

Hershey Vineyard (Howell Mountain), projected to be 100 cases in 2009, is 100% barrel fermented. The wine ages for 24 to 26 months in 100% new French oak barrels.

Lotus Vineyard (1,200 foot elevation below Howell Mountain) is a 300-case production. In 2006, this wine was 100% barrel fermented. In 2009, 50% was fermented in new concrete tanks (2- to 3-ton lots) and 50% fermented in barrels. Ageing in 100% new French oak lasts 24 to 25 months.

Helms Vineyard (Rutherford Bench) is also 300 cases. Since the 2007 vintage, this wine has been fermented about 50% in oak upright tanks (2- to 3-ton lots) and 50% in barrels. It ages for 18 months in 100% new French oak.

All barrel fermentations are done in 100% new French oak, with medium or medium-plus toast. Prior to 2008, Tonnellerie Baron and Tonnellerie Ermitage 400-liter barrels with a port and hatch in one head were used for fermentation. Starting in 2008, 225-liter barrels, with a port in one head, from the same coopers were introduced, with about 20% of barrel fermentation occurring in the 400-liter barrels.

Grapes are picked in early morning one day before processing. To ensure a starting must in the low to mid 40°F, the fruit is held overnight in a refrigerated container. After destemming and hand-sorting, whole berries fall through the head port, directly into the barrel. Each 225-L barrel receives 400 lbs of fruit. In 2009, a system was begun to fill two barrels simultaneously.

When the barrel is filled, the hatch on the port is sealed, and the barrel is placed on OXO racks for fermentation. Ferm-Rite "breathing" fermentation bungs are used throughout fermentation and maceration, which is replaced by a solid non-locking bung when the barrels are spun.

The must is allowed to warm on its own and all barrels ferment with native yeast and native ML bacteria. Available nitrogen levels are measured and adjusted as needed. Fermentation usually begins by day-three or four. Fermentation peaks in the mid to high 80°F.

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Sorting grapes followed by filling barrels at Dana Estates.

Each barrel is spun three revolutions, three times per day. Similar to Beaulieu Vineyard, included in each year's barrel purchases is at least one barrel with a plexiglass head. This barrel is filled early in the harvest season to allow Vawter an opportunity to assess cap properties and determine the cap management strategy for the vintage. Total skin contact time can be from 30 to 90 days. For extended maceration, dry ice or CO_2 gas is added to protect the must.

At pressing, a screen-tube is inserted through the bung-hole, a wand is placed inside the tube and free run wine is moved to tank utilizing a Waukesha pump. The barrel is then lifted by forklift over a cage for the JLB-12 basket press and the skins raked out through the open port in the head. Free run and press fractions are kept separate. The barrels are cleaned, the port hatch reinserted, and then filled with wine for ageing.

The wines are racked off of gross lees post MLF. The need for subsequent rackings, typically one to three, depends upon the wine and vintage character. All wines go to bottle un-filtered.

DANA

Vawter highlights the unique complexity found in wines fermented in barrel. "From stainless steel or cement fermentations we expect clarity of fruit expression. With oak fermentations we find more layers of complexity built into the wine."

Merryvale Starmont Winery

Merryvale Starmont Winery (Napa, CA) ferments portions of their Estate Syrah and Stanley Ranch Pinot Noir in French oak puncheons (with one head removed). In 2008, oak fermentation represented roughly 50% of the Pinot Noir blend (430 cases) and is projected to be approximately 25% of the Syrah bottling (500 cases). In 2009, eight French oak puncheons (four new, four second-fill) were utilized for fermentation. After fermentation of Pinot Noir,

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Removing fermented grapes from barrel at Sterling Vineyards.

the same puncheons then moved to the Syrah program.

The grapes for both varieties are night-harvested, arriving at the winery as cool as 45°F, and go whole berry, after destemming, into the upright puncheons. Dry ice is added to manage oxygen pick-up. There are 4 to 5 days of cold soak prior to native (un-inoculated) fermentation of about one week, with the peak reaching near 85°F.

Once yeast activity begins, the puncheons are punched down four times per day. Toward the end of fermentation, when cap-loosening is observed, punch downs are reduced to twice per day. When fermentation completes, the wine is pressed off the skins and inoculated with a malolactic culture.

For the portions of these wines not fermented in puncheons, closed-top stainless steel tanks are used, with gentle pump-overs for cap mixing. The puncheons are then included in the Syrah oak ageing program. The Pinot Noir ages in 225-liter barrels. Final blends for both wines contain 30% to 35% new oak and are bottled unfined/unfiltered.

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"We began using barrel fermentation because we liked the results from trials performed at Merryvale on Cabernet Sauvignon and Syrah, namely better color extraction and added weight and texture," explains Sean Foster, winemaker. "We also see it as a way to bring complexity to the estate Pinot Noir blend in particular, since all of the fruit that goes into this wine is of a similar profile. For both varieties, fermentation in open-top puncheons adds a layer of complexity to the final blend with wine fermented in closed top tanks."

In 2009, the Adams-Harbertson Assay was used to compare the tannin and anthocyanin make-up of the Pinot Noir fermented in puncheons and stainless steel tank. The first assays were run two weeks after completion of fermentation (unsulfured wines).

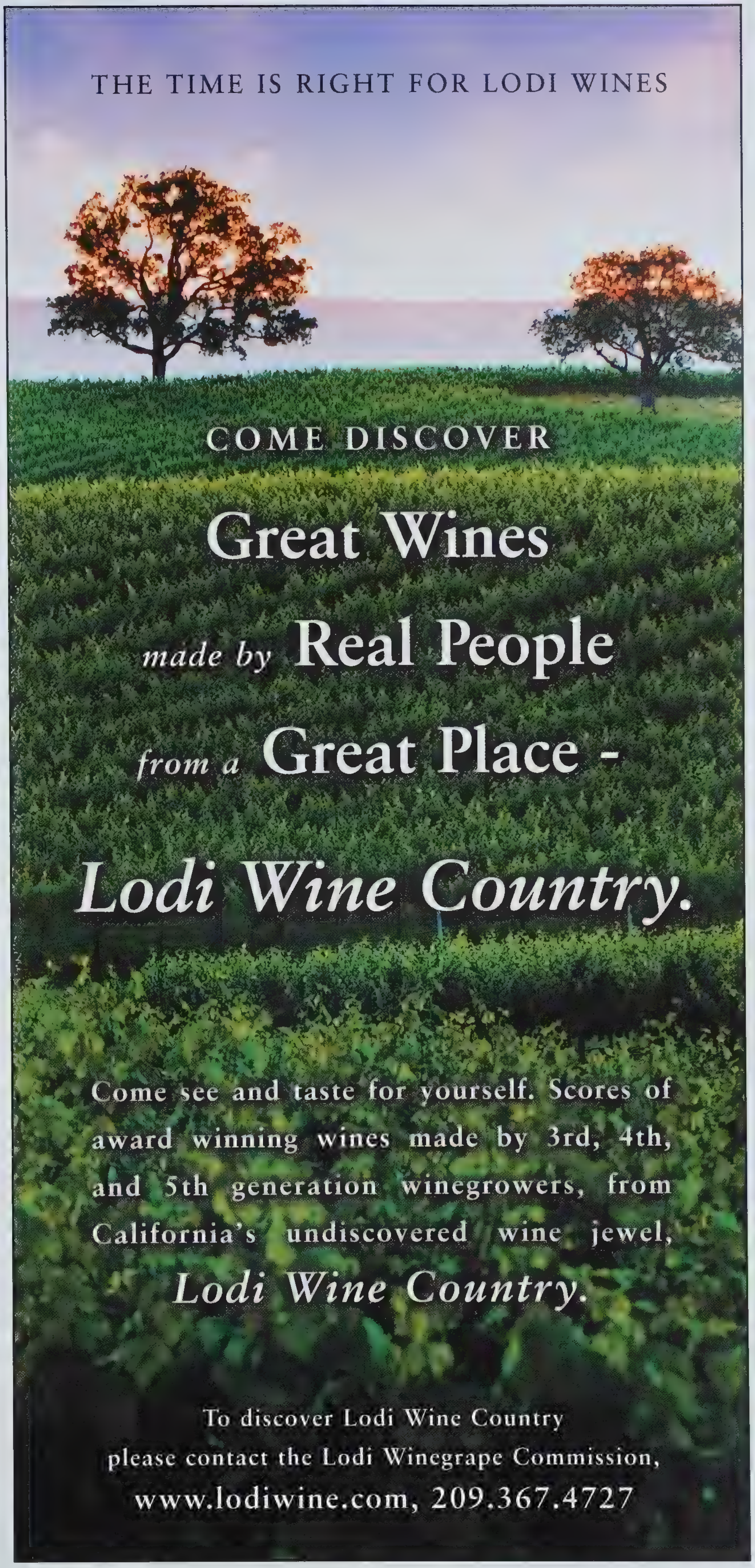
"The analysis show that the amount of anthocyanin content is higher and significant in the barrel-fermented Pinot Noir, and while phenols and tannins were also higher, but they were not significantly so," notes Foster. The analysis will be repeated throughout the cellar life of the wines to track their evolution.

Conclusion

The impacts due to interaction between fermenting red wines and oak have been studied and documented, although the winemakers we spoke to are unaware of research that looks specifically at barrels or puncheons as the oak fermenting vessel.

Explanation of the impacts due to the small size of oak barrel fermentors compared to stainless steel tanks seem to be empirical at this time. This includes factors such as temperature profiles of the fermentation and maceration plus exposure to oxygen. Perhaps the growing popularity of the technique among red winemakers will inspire this more focused study. ■

Linda Trotta is a consulting winemaker with more than 20 years of experience in the wine industry. Prior to starting her consultancy business in 2009, her most recent role was Director of Winemaking and Winegrowing at Gundlach Bundschu Winery in Sonoma, CA. www.LindaTrotta.com



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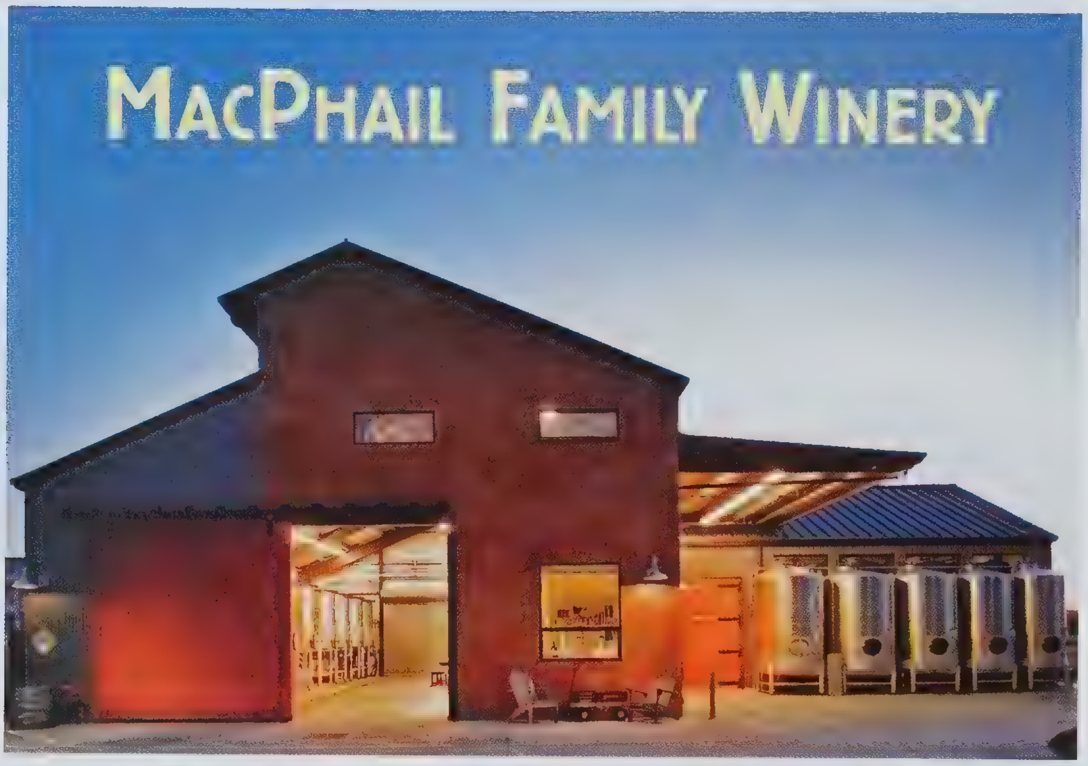


MacPhail Family Winery with a big red barn door open to the fermentation room. The "L" shaped floor plan created an opportunity for outdoor covered work space to receive grapes and convenient access to cool temporary storage in the barrel room to hold grapes prior to processing.

Producing artisan Pinot Noir in proficient workspace

BY Ron Verdier,
Verdier Architects, Boonville, CA

MacPhail Family Wines has built a proficient winery on a one-acre parcel of land just outside the city limits of Healdsburg, CA. James MacPhail (proprietor and winemaker) created a small and efficient winery in his backyard adjacent to his residence. "This home and winery match my vision. It is located in a winegrowing region with a long history of agriculture and small family farms."

With a use permit to make only 5,000 cases, it was clear that production would remain small. This is fine for James, who wishes to focus on handcrafted, high-quality wines sourced from small vineyards with limited yields. After making his first six vintages in a custom crush facility 20 miles away, MacPhail realized that the care and diligence he required to make his fine wines would mean building his own facility.

The challenge was to place this highly functional, energy-efficient winery on a one-acre parcel of land shared with a home, detached garage, and all utilities that are common with rural properties, such as septic and water systems. MacPhail was looking for a perfect fit both functionally and aesthetically. The new winery could not overwhelm the residence, the surrounding context, or the quiet rural neighborhood.

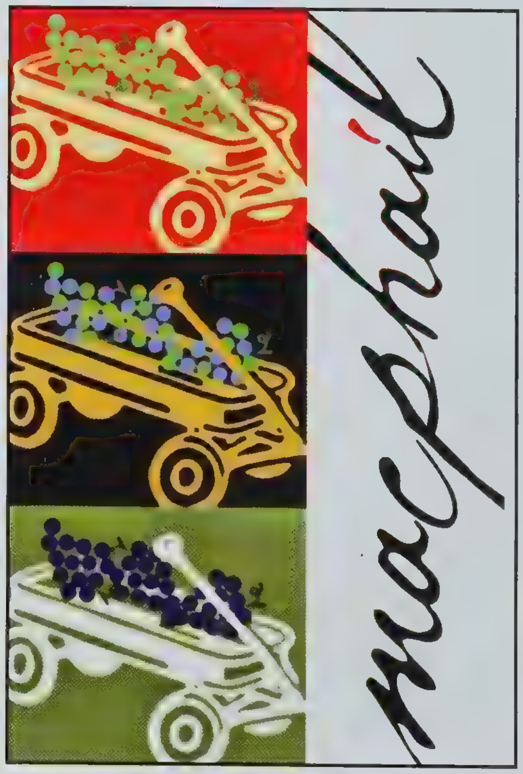
Factors affecting the design of a winery include aesthetics, function, production flow, energy efficiency, and life cycle costs. For James MacPhail and his design team, the process was complicated by the size of the parcel on which the winery was to be built.

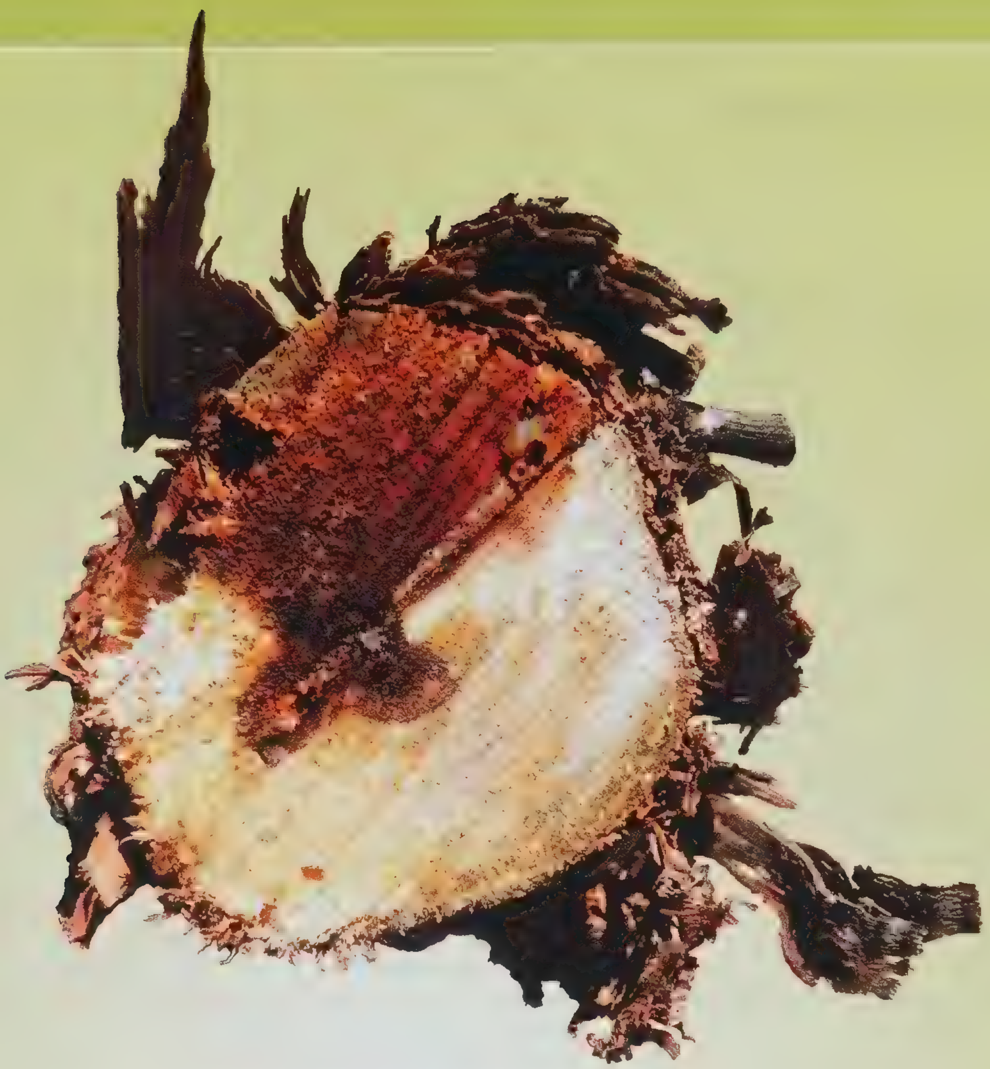
Challenges of a small site

From preliminary sketches, MacPhail's collaboration with the architect centered on site placement and production flow, which were critical for the winery to function efficiently while providing privacy for the residence. The 4,200-square-foot structure needed to be compact and practical, leaving few options when deciding where to place the winery. The site had to accommodate a 40-foot bottling truck that would maneuver into position under a covered work area at least once each year.

Vernacular images of rural barns and utilitarian structures became the starting point. The southwest corner of the property became the prime location, as it made use of an existing driveway and parking areas. Pushing the winery to the far corner preserved valuable real estate in front of the winery and the westerly views from the home's kitchen.

An L-shaped floor plan was chosen to facilitate production flow. The main room of the winery is the fermentation room, where eight six-ton stainless steel and two French oak fermentors are located. Perpendicular to this, with a large glass roll-up door, is the barrel room.





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The 200 square foot lab is located in one corner of the fermentation room, ideal for receiving and processing samples and to greet visitors. The long counter has two functions; everyday lab work, and a place to have guests sample wine.

Access from the barrel room to the covered crush pad is through two large doors. Blending tanks are located on the exterior east wall of the barrel room and are close to the bottling truck docking station. A covered work area is adjacent to the lab and barrel room. The lab is located on the northeast corner of the fermentation room, a central location to receive samples and for visual control of the property's entrance.

The design blends in with the rural farmland setting and integrates with existing structures on the property.

The winemaker's approach to winemaking

Understanding winemaking and the procedures involved helped to inform the design process for the new winery. MacPhail makes only Pinot Noir from grapes sourced from quality vineyards in the Sonoma Coast and Anderson Valley appellations. Working with growers who share his commitment to sustainable farming practices, his goal is to produce premier wines from single vineyards. A non-interventionist approach is grounded in the belief that extraordinary wines come from extraordinary grapes.

Artisan methods used to create MacPhail wines include hand-sorting of the fruit, first in the vineyard and then on the crush pad. Grapes are de-stemmed without crushing and fermented in small lots. Only native yeast is used for primary fermentation, with a boost of a commercial yeast for completion.

All punch-downs are done by hand and the wine is moved by gravity to barrel, where malolactic fermentation is completed. The wines are aged "sur lies" (on the lees) and stirred for flavor extraction (*batonnage)* prior to bottling. To achieve the desired richness, the winemaker chooses not to fine or filter the wines.

Adjacencies, placement, production flow and, proximity were key to the harmonious flow of winemaking from crush to bottling. The length of

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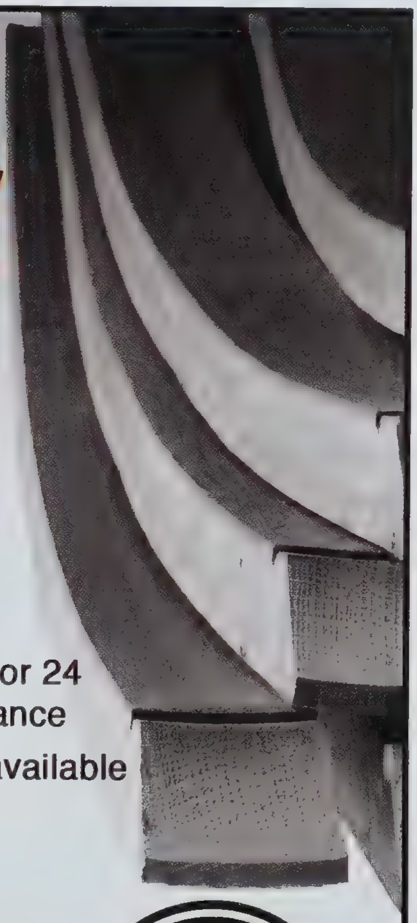

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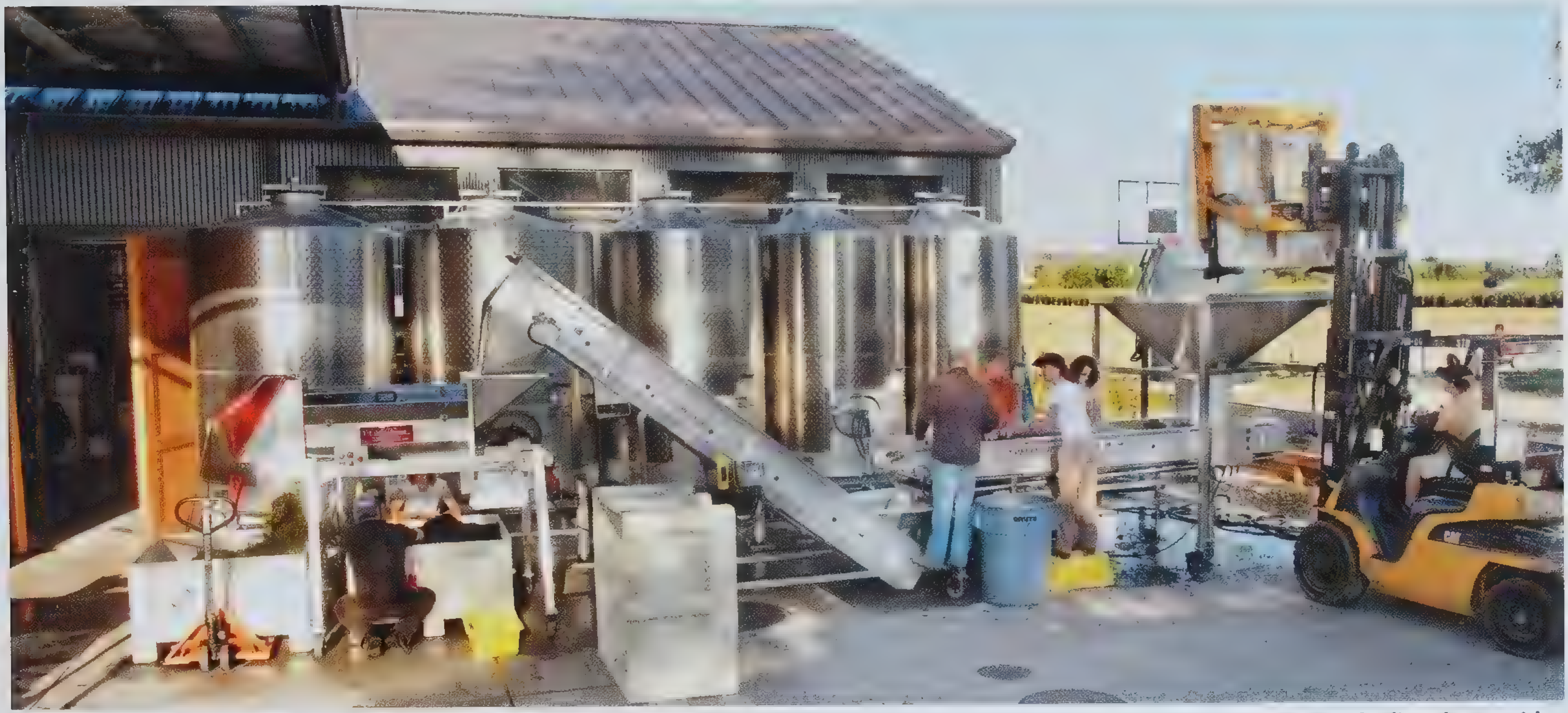

The crush pad with P&L Specialties conveyor and sorting table for careful hand-sorting of grapes. Glycol jacketed blending tanks line the outside wall of the barrel room.

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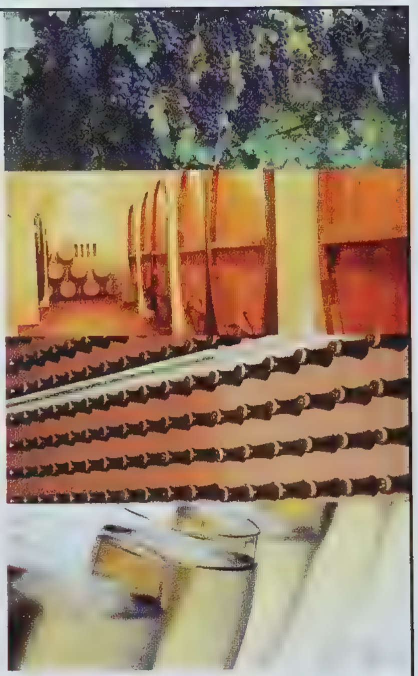

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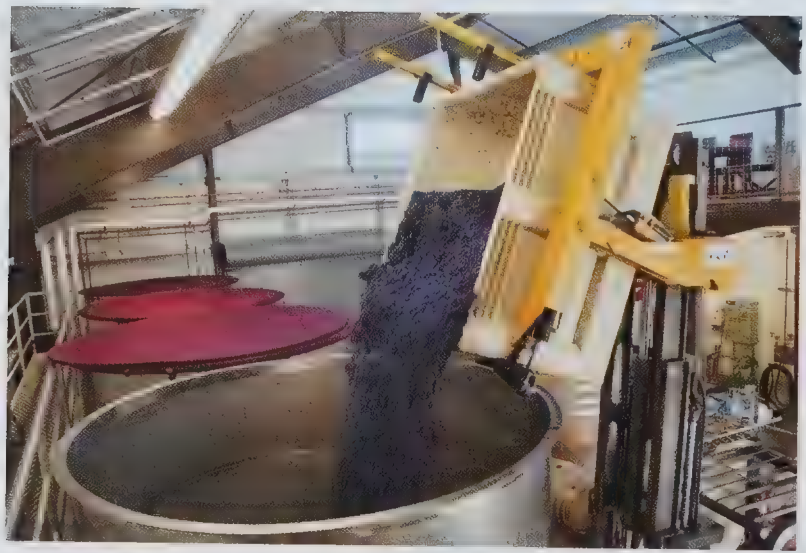
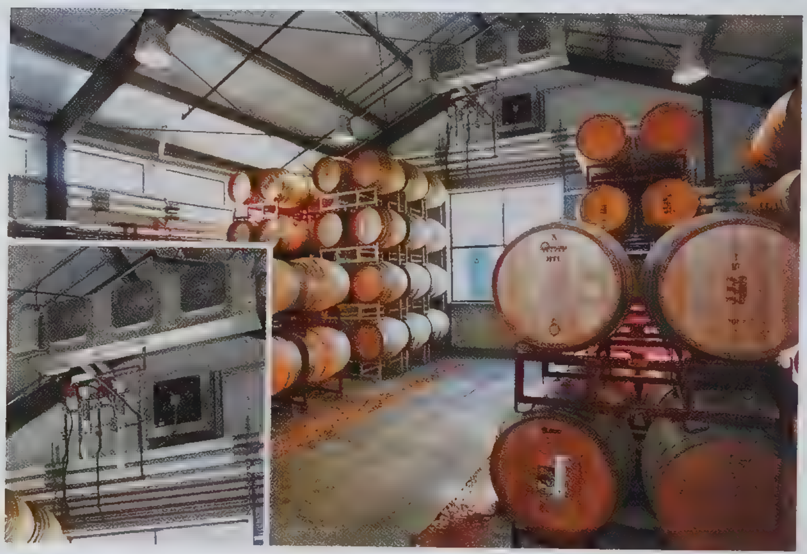


Forklift dumps grapes into one of eight open-top stainless steel fermentors in the 30 foot x 60 foot fermentation room. Natural light enters the room through clerestory windows above the fermentation tanks.



Maximum capacity of the barrel room is 300 barrels. Between the rows of barrels are gravel-filled drain-trenches. Inset: Night-cooling fans and Smart Fog ES 100 humidifier.

the fermentation room was in direct response to the size and quantity of the stainless steel fermentors required. Since this equipment is used only once each year for a brief period, the fermentors were placed on an outside wall, which allows the center of the room to remain open. The winery reflects MacPhail's minimalist approach to wine production.

Sustainable building elements

A steel frame was chosen because it is efficient, fast to erect erect, and cost-effective. Steel frames generally use fewer structural members and span

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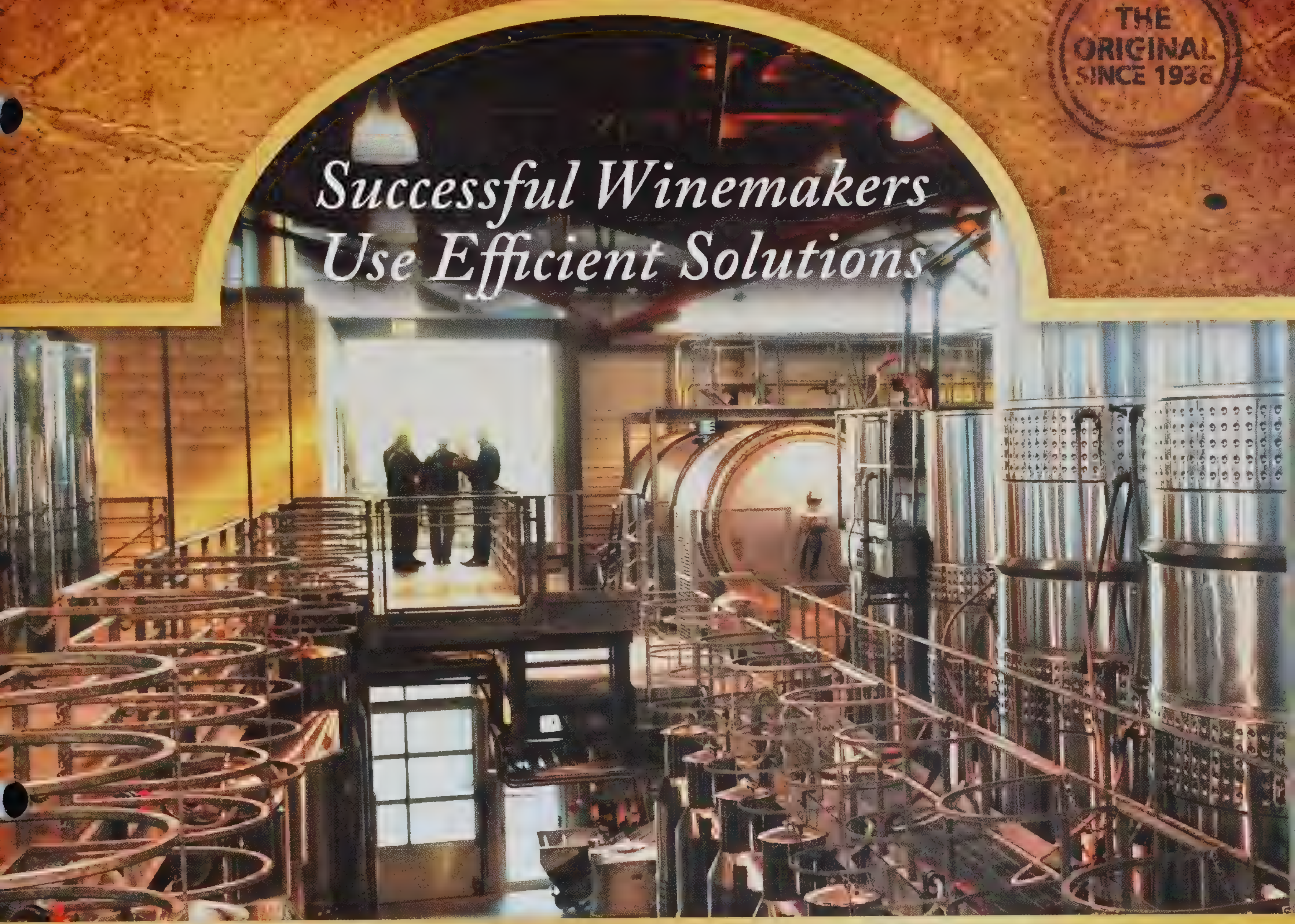

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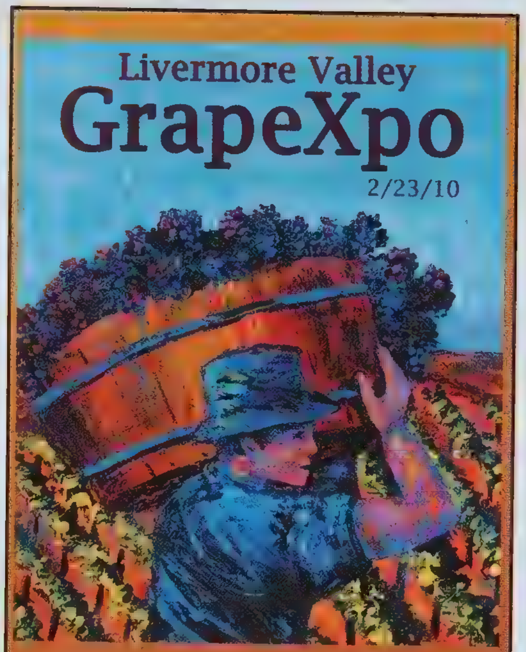

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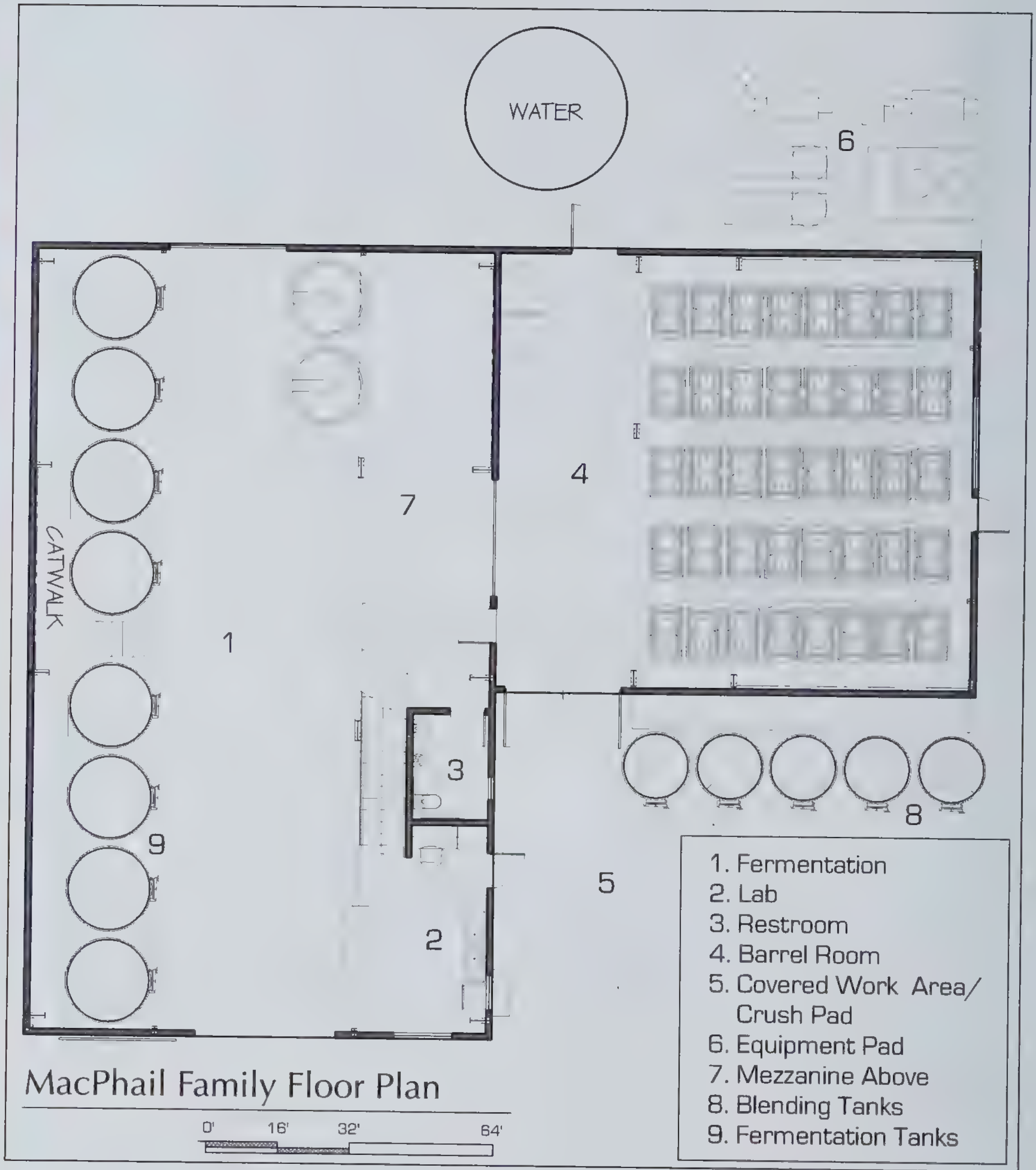

MacPhail Family Floor Plan

greater distances than conventional wood framing. In addition, MacPhail wanted to limit the use of wood whenever possible to avoid the possibility of contaminating the winery with molds. A high percentage of the content of steel framing is recycled and considered a sustainable product.

Preliminary design ideas considered solar orientation, shading, daylighting, and natural ventilation. Quality windows and good insulation play a key factor as part of the building's envelope and lead to considerable energy savings. Such simple sustainability and energy-saving features were incorporated by the design team, which included mechanical engineer Paul Larkin of Larkin & Associates (now merged with Guttmann & Blaevoet Consulting Engineers in Santa Rosa, CA).

As a proponent of "integrated design," Larkin explains that efficient building design and orientation are essential, and together with passive energy systems, establish the energy profile of a project before mechanical conditioning systems are applied.

Solar systems

Incorporated into the winery's design is correct solar orientation, solar shading, and the use of cool roofs (see below). The completed structure features an efficient, insulated panel wall and roof system, with orientation and window placement to minimize solar heat gain. South-facing roof areas are suitable for future solar electric and hot water systems. Installation of solar panels in 2010 should reduce the monthly electricity bill to a minimum.

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We applaud South Coast Winery's extraordinary achievement. For this Vintage performance and others before it, we're proud to keep the winning tradition growing.

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Cooling and Heating systems

A night-air cooling system for the barrel storage room uses night-time ambient air to cool the thermal mass contained in the barrels of wine, which, in turn, minimizes the need for mechanical cooling. This is accomplished with a single exhaust fan placed high, and some low, motorized air-intake louvers with automatic controls.

The water heating system uses a multi-stage boiler and a small, insulated storage tank, to minimize heat loss. Highly efficient HVAC and refrigeration systems lead to further cost savings.

Daylighting

Natural daylight plays a key role in the winery, which gives the occupant a feeling of well-being, health, and comfort. The fermentation room has south-facing clerestory windows running the length of the room. A large overhang cuts off any direct sunlight, which helps to avoid any heat gain. High windows in the gable end bring in morning light, and skylights help to give the room a natural atmosphere.

In winery design, there is a delicate balance between the values of natural light and the reduction of heat gain, especially in the barrel room where high thermal containment is necessary.

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Cool roofs consist of materials that very effectively reflect the sun's energy from the roof surface. They also have high emissivity, allowing them to emit infrared energy. Cool roofs have a high solar reflectance or "albedo," which helps to reflect sunlight and heat away from a building, reducing roof temperatures. A high thermal emittance also plays a role, particularly in warm and sunny climates.

Together, these properties help roofs to absorb less heat and stay up to 50° to 60°F (28° to 33°C) cooler than conventional materials during peak summer weather, thereby reducing the heat transferred into the building below. This helps to reduce energy costs, improve occupant comfort, cut maintenance costs, and increase the life cycle of the roof.

The constructed wetland was designed to enhance the site as a landscape feature and provide a system to allow the reuse of treated wastewater.

Wastewater "wetland system"

Heather Shepherd (with The Wallace Group in 2007), designed the wastewater management system to fit and enhance the site while allowing reuse of treated wastewater. With only an acre to work with, the solution was not immediately obvious.

The choices included a traditional septic tank with leachfield, a package plant system with irrigation reuse, or a constructed wetland (CW) with irrigation reuse. The leach field option was eliminated because of limited space and the inability to reuse the water for landscape irrigation. The package plant system would offer irrigation reuse and a small footprint, but would be more expensive and energy-intensive. The constructed wetland became the most logical choice.

With a constructed wetland, the only energy use is for pumping the

Continued on page 105

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Sunrise over Carneros after Sangiacomo night harvest. (L to R): Angelo Sangiacomo on grape tractor; Buck Sangiacomo pulling a light-frame; Steve Sangiacomo, Mike Sangiacomo, and Mike Pucci sorting grape clusters. Photo By Jim Caudill.

A deeply rooted SANGIACOMO family tradition

**BY Merilark Padgett-Johnson,
Viticulture Coordinator
Santa Rosa Junior College**

There is a good reason why more than 30 wineries proudly display "Sangiacomo Vineyard" on their wine labels. Ask a Sonoma County winegrape grower the person they most respect in the industry, and the reply may be: "Angelo Sangiacomo."

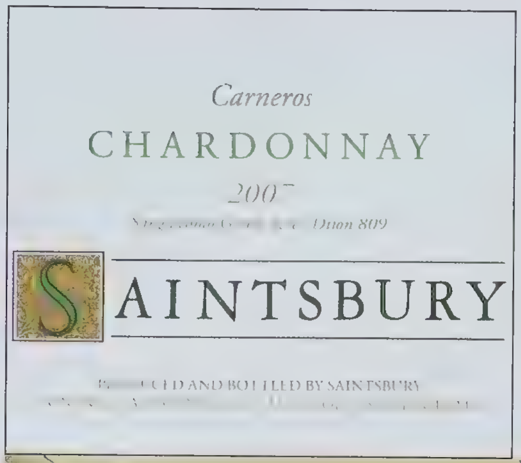
The Sangiacomo family has been working and caring for their land and producing premium fruit for 80 years. They have successfully adapted to industry changes while keeping to their family traditions and values. In addition, they have been leaders in new directions for the winegrape industry.

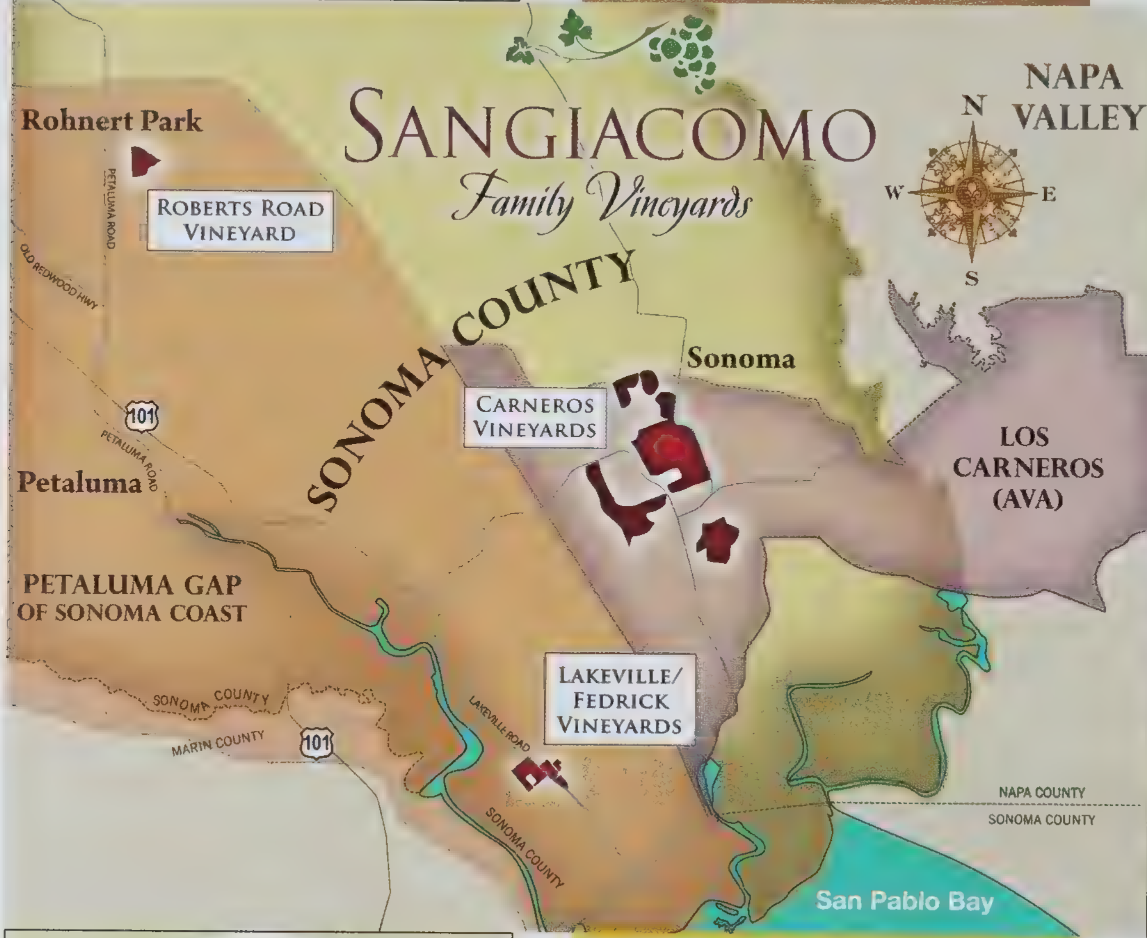
Family

Vittorio Sangiacomo came from Genoa, Italy as a teenager in 1913, and worked in San Francisco. In 1927, he bought the Homestead Orchard in Sonoma Valley, which had 52 acres of fruit trees, and married Maria (also from Genoa) in 1928. With four chil-

Sorting of whole-cluster Sangiacomo Chardonnay during night harvest. Photo by Don Neel

Some of the wineries using Sangiacomo vineyard designations.





dren — Angelo, Buck, Bob, and Lorraine — they ran a successful business farming tree fruit (pears, apples, prunes, and cherries).

In 1969, the family first planted grapevines on the Green Acres ranch (the only remaining original planting, now called the Heritage block), on a two-wire vertical trellis. Angelo was head of the business and the second generation's four siblings ran the company together. The family continued to convert acres of fruit trees to grapevines over the next two decades, providing client wineries with premium quality fruit.

The four siblings were visionary in that they looked at a 20- to 30-year cycle when making planting decisions. Their goal was production of premium quality grapes, rather than reacting to an ephemeral market shortage of a particular cultivar. A guiding principle was that choosing the most suitable planting sites would increase the chances of longevity of that vineyard.

Between 1997 and 2000, the day-to-day responsibilities of farming operations were gradually turned over to the

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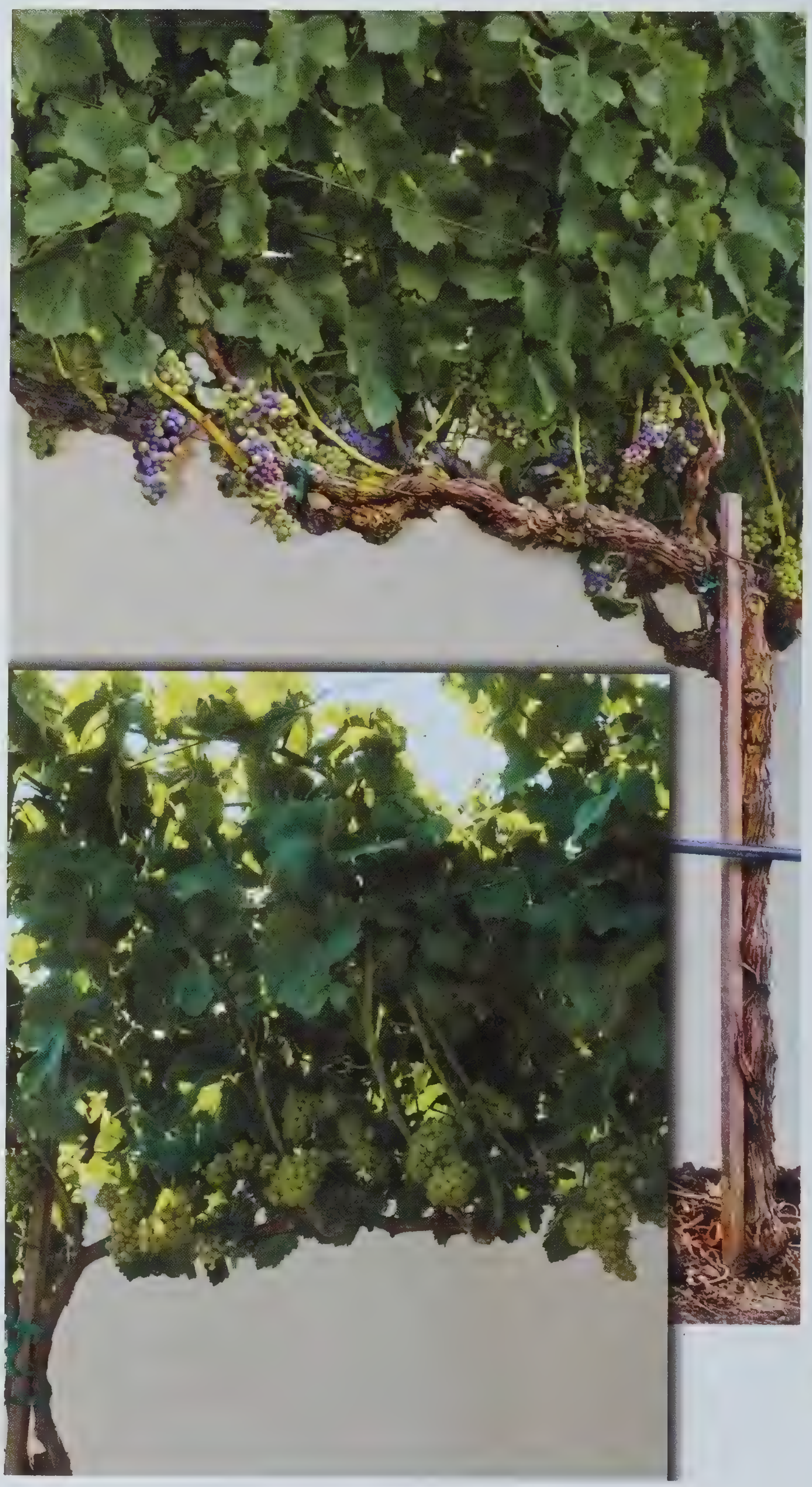
Chardonnay [below] on bilateral VSP trellis with a vine-row orientation that does not allow direct sun exposure on the grapes. Aggressive manual leaf removal is focused inside canopy and all around grape clusters. All Sangiacomo leafing is done on the morning side of the vine. Pinot Noir [right] on bilateral VSP trellis with a vine-row orientation that allows more direct sun exposure to grape clusters. Leaves are manually removed below clusters but not above, to provide some shade-protection from direct sunlight. The common goal of all Sangiacomo vine canopies is to maximize air circulation and indirect sunlight.



third generation of Sangiacomos — sons Michael and Steve and daughter Mia. However, the second generation of Sangiacomos remain very much involved with vineyard operations, offering their experience, expertise, and historical perspective.

The third generation continues the family tradition of commitment to caring for the land and producing pre-

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mium fruit for winery clients. Because the family has farmed the land for over 80 years, they have an inherent understanding of the soils and climate, and thus what it takes to produce the best fruit possible. Today's management team consists of Angelo, Buck, Michael, Steve, and son-in-law Mike Pucci.

Adaptation and pioneering

1989 was the first year when new plantings were not on AxR#1 rootstock. The family selected 5C and SO4 rootstocks for tolerance to phylloxera, which AxR#1 no longer provided.

In 1990, the Sangiacomos pioneered into a new area, planting 92 acres of winegrapes in the Lakeville/Fedrick vineyards, their southernmost vineyards in Sonoma County.

Since 1992, 75% of the AxR#1 vines have been removed and their acreage replanted with vines grafted onto phylloxera-tolerant rootstocks such as 5C, 101-14, 110-R, 3309, 1103P, and SO4. Replantings have varied from 20 acres to 85 acres per year.

Of the 610 acres replanted, 275 acres were planted back to the original cultivars (25 acres Pinot Noir and 250 acres Chardonnay). The other 335 acres were converted to a different cultivar than what was originally grown in the block. Of these, 125 acres were converted from Chardonnay to Pinot Noir, and 150 acres from Pinot Noir to Chardonnay. The remaining conversions were 25 acres of Merlot to Chardonnay, 15 acres of Chardonnay to Merlot, 10 acres of Merlot to Pinot Noir, and 10 acres of Pinot Noir to Merlot.

Decision making about when to pull vines and replant a block is complex — there are no quick reactions. "We examine and monitor: a) wine quality, b) vine health and appearance, and c) yield of a specific block over time," explains Steve Sangiacomo.

When converting from one cultivar to another, several factors are considered: geography of the ranch, results of soil tests from the block, mesoclimate differences, and comparative tasting of wines from different blocks. Typically, deep clay soils will be replanted to Chardonnay, and the shallower, better drained, and less fertile soils will be replanted to Pinot Noir.

The Sangiacomos and the winemakers/grape buyers taste all wines made

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from each ranch, including wines made from individual blocks within the ranches. Wines made from contiguous blocks are compared to one another, and if a wine does not stand up to the others, a decision will be made to convert that block to a different cultivar that is more suited to that site.

Client wineries have a continuous dialogue with the family regarding wine styles. The Sangiacomos seek to provide fruit with unique characters that will showcase the individual program(s) of their client wineries. Clonal choices are planting decisions driven by optimal site compatability, and, at times, winery requests.

Fine-tuning cultivar and clonal choices to a specific site helps achieve those unique fruit characters. The ranch and individual block locations affect specific flavors of the fruit, and different clones within a site will add different structural components to a wine.

The ideal minimum acreage of a specific rootstock/clone combination is five acres, but the Sangiacomos will develop and farm two acres if that is what a winery needs — another example of their successfully adapting to industry needs.

A new area planted in 1999 was 120 acres on Roberts Road, east of Rohnert Park. Grapes from this ranch (50 acres Pinot Noir and 70 Chardonnay) are sold to 12 wineries, and 75% of the wineries purchasing fruit boast the Sangiacomo Vineyards designation on the wine label.

Today, the Sangiacomo family farms 1,330 acres of vines in the Carneros region and 270 acres in the Petaluma Gap (150 acres at the Lakeville/Fedrick site and 120 acres on Roberts Road). The 1,600 acres are divided into 14 ranches (see map).

Table I shows the current acreage by cultivar farmed by the Sangiacomo family.

Table I. Sangiacomo Vineyards 2009 acreage by cultivar

Chardonnay	Pinot Noir	Merlot	Syrah	Pinot Gris
1040.6	480.3	68.7	8.3	2.1
65%	30%	4.3%	0.52%	0.13%

One hallmark of Sangiacomo family viticulture is their commitment to farming their large acreage as much

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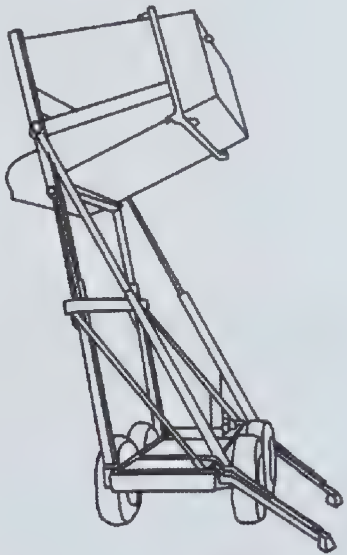

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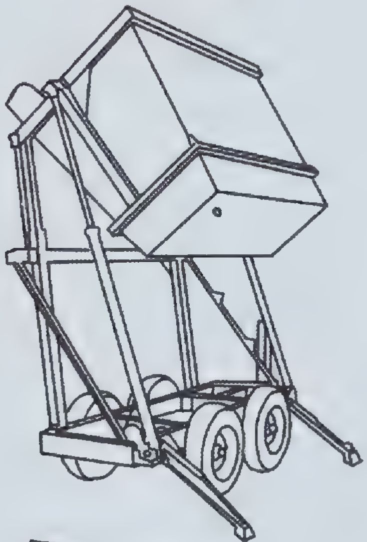
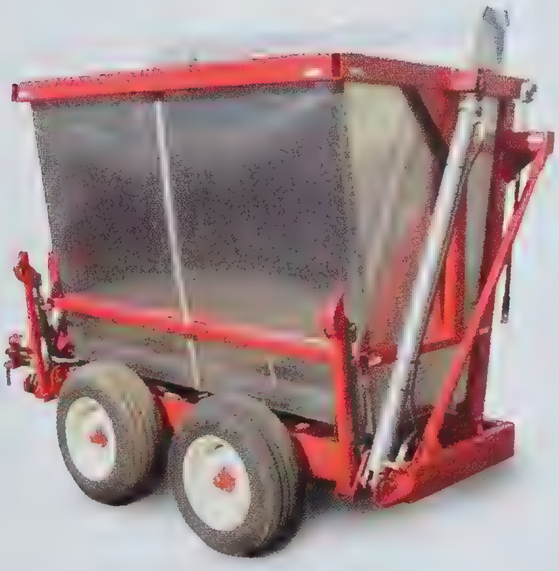
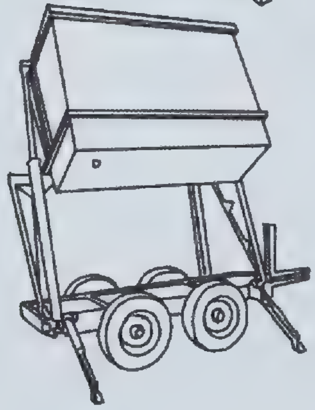
- access steps on frame for bin inspection
- running gear rated at 10,400 pounds
- tandem axles





This self-dumping harvest trailer can be used with mechanical harvester. Its innovative design is perfect for use in any vineyard layout.



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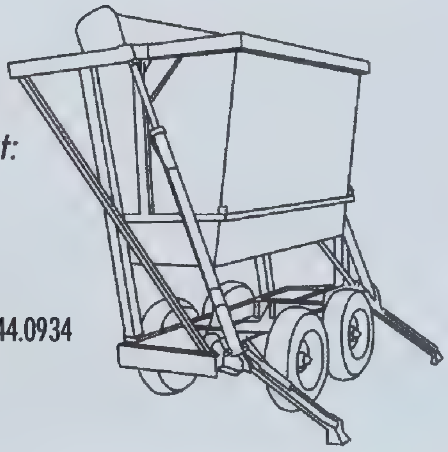

smaller blocks, that figure being from 2.5 to 5 acres. Over the last 10 years, all new plantings have been installed in 5-acre irrigation blocks.

"Although a ranch, as a whole, may be uniform and have similar soil profile, aspect, and terrain," notes Steve, "our new vineyard development plans include the ability to farm in 5-acre or smaller blocks. All new irrigation systems include a ball-valve at each riser, enabling irrigation to be delivered to each vine row. If the entire block does not need irrigation, we have the ability to irrigate just part of a block."

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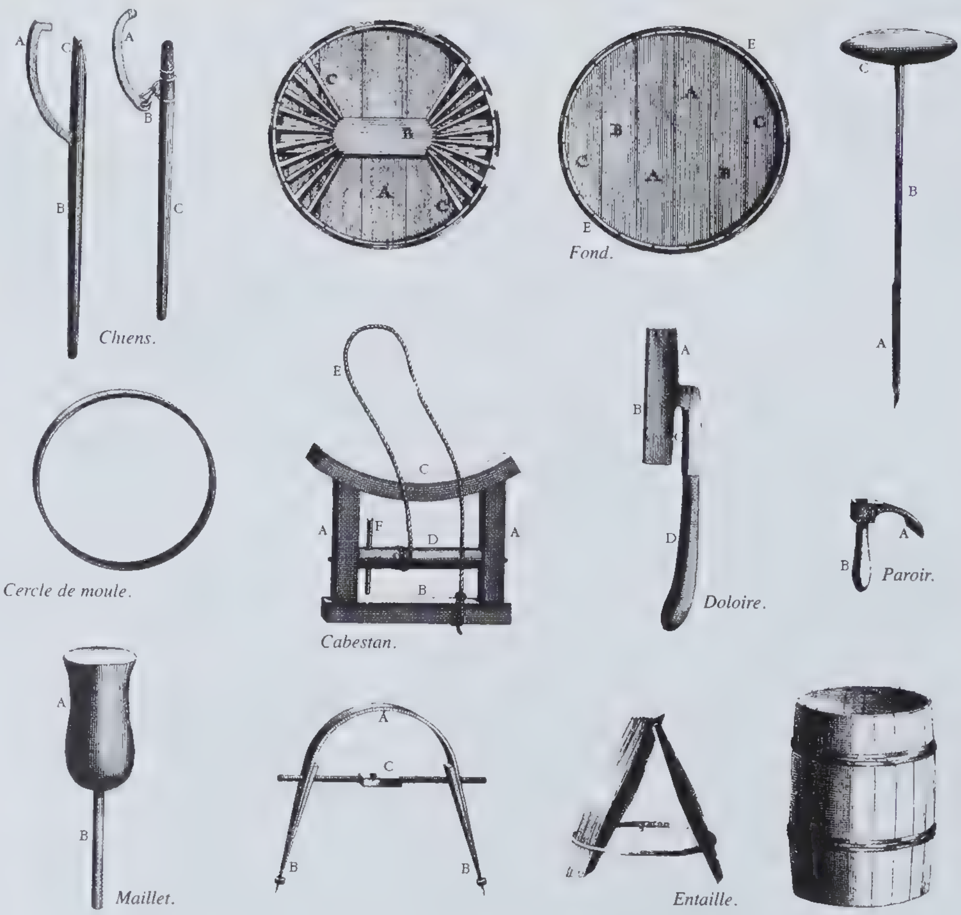

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Designing their vineyards as small blocks allows the option of treating each small block separately, and making input decisions appropriate to that particular five acres — another way to custom-farm for a client winery. This requires an incredible amount of attention to detail, but the end result is small lots of premium quality fruit that are precisely tailored to each winery's expectations.

Farming strategies

Sangiacomo family farming capitalizes upon site differences, cool growing conditions, low yields, and tailoring specific cultivar/rootstock combinations to soil types. It is definitely not one-size-fits-all for Sangiacomo Vineyards.

With their special expertise in cool-climate viticulture, the family has recognized and taken advantage of the various mesoclimates within their vineyard sites. Their pioneering spirit endures, as they have successfully planted in areas previously considered to be too cool to ripen grapes.

Management of irrigation, crop load, and vine canopy comprise the basic elements of the Sangiacomo farming focus. "They are not mutually exclusive of each other and need equal attention to achieve our desired results," notes Steve.

Irrigation strategies

Irrigation management is prioritized in order to promote healthy and balanced growth of grapevines that will properly ripen high-quality fruit. Decisions about when to start, and how long to irrigate a vineyard block, are based on various factors. Table II is derived from the Sangiacomo Vineyards Farm Plan.

Yield management

Along with farming large acreage on a small acreage scale, the Sangiacomo' commitment to quality is reflected in the yields allowed in their vineyards. Tonnages from their ranches vary from 2 to 5 tons per acre, all modest figures.

Chardonnay yield depends on the clone. The Wente clone may yield 2.0 to 2.5 T/acre, Dijon clones tend to yield 3.0 to 3.5 T/acre, the Robert Young

Table II. Sangiacomo Vineyards Farm Plan

Factors used to determine WHEN TO START irrigation

- Visual cues from shoot tip growth/vine growth
- Rainfall data from Spring
- Date of last significant rainfall event
- Vine age and health
- Soil type
- Historical experience
- Soil moisture data: neutron probe and gypsum block readings
- Vine water stress data: leaf pressure chamber and porometer data
- Cultivar

Factors used to determine HOW LONG to irrigate

- Historical experience
- Impending weather — especially potential heat spikes
- Soil type and depth
- Weather reporting stations
- Vine age and health
- Vine growth
- Soil moisture data: neutron probe and gypsum block readings
- Vine water stress data: leaf pressure chamber readings and porometer data

clone yields 3.0 to 3.5 T/acre, and Clone 4 will yield 4.5 to 5.0 T/acre.

Pinot Noir yield depends on clone and site. Dijon clones at the Roberts Road site yield from 2 to 3 T/acre. The same clones grown in the Carneros region will yield 3.0 to 3.5 T/acre. The Pommard and Martini clones tend to yield from 3.5 to 4.0 T/acre.

Small-block custom farming achieves this goal. Each block has its target yield that assures fruit quality optimization. These target yields are closely monitored, and adjustments made when necessary.

Canopy management

The Sangiacomos utilize a variety of techniques and practices to grow balanced vines that will produce the premium quality fruit that their clients demand and expect.

"We measure and track pruning weights on all blocks," explains Steve. "The general rule is: a vine is pruned to approximately 10 to 12 buds per pound of brush weight. This figure can vary depending upon the site, cultivar, and target yield."

"Three years of tracking pruning weights and bud numbers per vine has shown this figure to be a useful guideline," adds Mike. "If a particular block is not performing as expected, the bud count/pound pruning weight will be adjusted. We do look at the pruning weight averages over several years. Our goal is to 'keep an even keel,' and not to over-react to just one year's worth of data."

Since 2006, one hedging pass (if needed) has been performed on the top of Chardonnay vines in late June/

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early July to discourage lateral growth and resultant shading. Two mechanical hedgers are used plus hand-tipping. Hand-tipping is utilized early in the season, followed by mechanical hedging if necessary.

Basal leaf removal is done to provide even, indirect, and filtered sunlight into the fruit zone and also to provide good air movement. Leaves in the interior portion of the canopy are removed, and leaves directly above the clusters are left on the shoots to minimize direct exposure of sunlight to the fruit, and potential sunburn risk. The increased air circulation gained with basal leaf removal decreases fungal disease pressure.

In 1993, the Sangiacomos first planted various new clone/rootstock combinations on a vertical shoot positioned (VSP) trellis. On high-vigor sites, cross-arm trellis experiments aim to more effectively spread out the canopy to maximize the number of exterior leaves, and to minimize the amount of potassium going into the fruit.

The fertilization program is based on multiple years of bloom-time and véraison petiole analyses. Bloom-time petiole data is monitored and tracked, and soil amendments applied post-bloom if necessary. The data is reviewed in respect to the block's history with a sustainable, long-term approach.

For blocks that may have nutritional issues, véraison petiole analysis is done to examine the mineral nutrition status of those particular vines more closely. With this strategy, the family is able to direct their energy precisely where needed. When fertilization is necessary, drip or foliar applications are made. Nitrogen, potassium, phosphorus, and calcium are applied through fertigation. Boron, magnesium, and zinc are applied in foliar sprays.

Vineyard floor management practices are dictated by a site's vigor potential and terrain. In low-vigor sites where a summer cover crop competes with the vines, every tractor row may be tilled. Factors such as vine health, rootstock, and soil type are all considered.

Tilling alternate tractor rows is the preferred practice. Cover crops growing in tractor rows promote the beneficial microorganism populations in the soil, and the beneficial insect populations above ground. The practice is to

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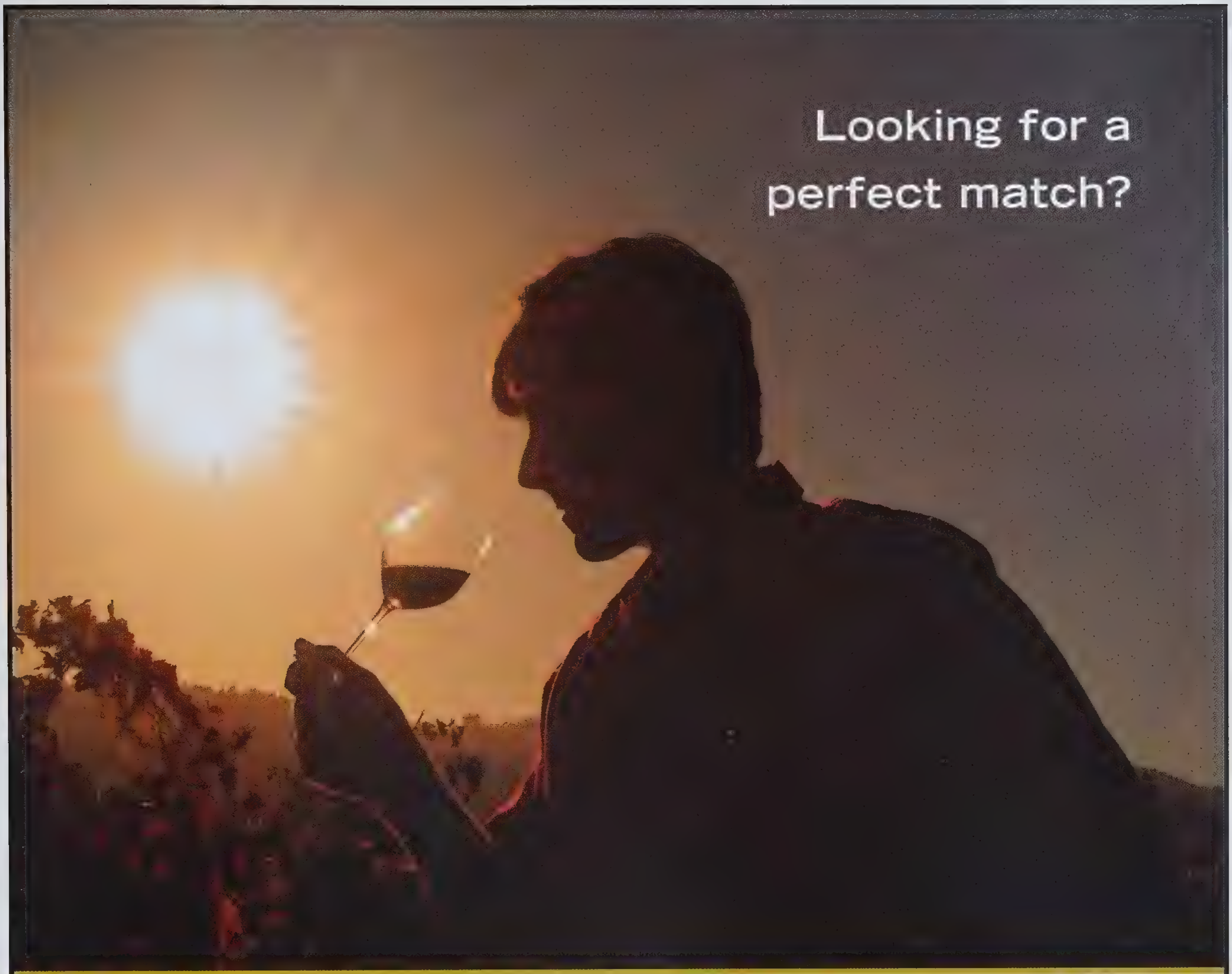

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till alternate rows every other year, so each tractor row receives the positive effects of the cover crop every other year. Permanent cover crop is utilized on hillside vineyards where there is erosion potential, and also in high-vigor sites so the cover crop will compete with the vines.

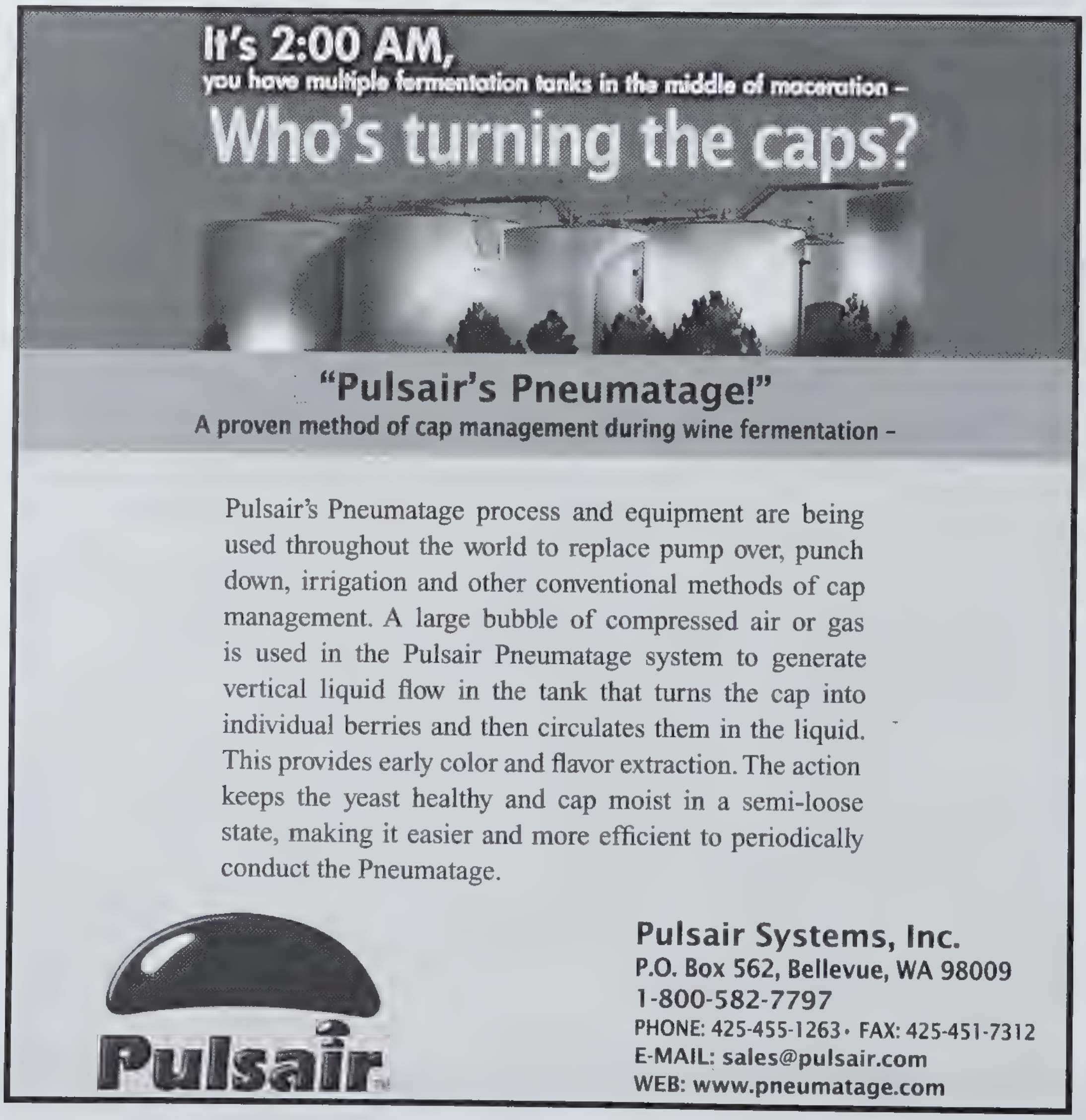
The Sangiacomos responded to the 2008 damaging spring frost by installing four wind machines on the Roberts Road ranch. As water availability becomes more of an issue, utilizing wind machines for frost protection makes economic and ecological sense.

The Sangiacomo family pioneered night harvesting in Sonoma County. "In 1991, our mechanics designed and built light towers to facilitate night harvesting of grapes," recalls Mike. "As the demand for night-harvested fruit increased, we took our light tower design to an engineer to make it even safer." They have shared their light tower designs with other vineyard management companies.

"We have installed sorting trays on trailer platforms in order to facilitate hand-sorting of all grapes, including night-harvested fruit," adds Mike. "We have 30 light towers that can light up four vine rows each. Each night-harvest site usually has two or three light towers in that vineyard block."

In order to keep track of their all vineyard data and timing of operations, the Sangiacomos are utilizing a new Meristem database technology. The software is GIS-referenced, and allows tracking of farming inputs down to individual vine rows. Information gathered in the field is input into handheld PDA devices, and the updates are sent wireless to the main database on a server.

Employees in the field can access the database for real-time updates and maps for all vineyard information. The family stresses the value of this technology as enabling immediate access to information regarding the management of their many acres, blocks, and ranches spread out over Sonoma County.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Business Strategies

The primary business strategy of the Sangiacomo family is to value their relationships with client wineries and to keep them happy. They can offer fruit from their multiple sites and ranches, where they have many rootstock/clone combinations, soil types, and mesoclimates. A winery can choose specific blocks in order to create optimum blending capabilities. Since the family will night-harvest, they can deliver cold fruit to a winery. Clients benefit from the Sangiacomos' expertise in cool-climate viticulture and commitment to quality and service.

Even though the Sangiacomos farm 1,600 acres of winegrapes, they will sell 2- to 5-ton lots to a winery. They will also sell 10 to 20 tons of multiple lots delivered on the same truck (for small wineries).

Another hallmark of the Sangiacomo family is that their business relationships are more partnerships than relationships. With some wineries, these partnerships are long-standing, and the Sangiacomo family still does business on a handshake basis.

Mark Burningham, partner and grape buyer for Benzinger Family Winery (Glen Ellen, CA), says, "The Sangiacomos and Benzingers have operated on a handshake basis for 20 years. Their energies are focused on fruit quality, not on meeting specific requirements of a written contract.

"The Sangiacomos enter into and stay in a winery relationship looking at the long-term, enduring through the ups and downs of the industry — again, more of a partnership than a relationship. Responding to a Benzinger Family Winery request in 2008, the Sangiacomos began farming four 5-acre blocks of Chardonnay organically. They will continue with this and apply for organic certification after the 2010 growing season."

As another example of their absolute commitment to their relationship with a client winery, they grow two acres of Pinot Gris specifically for Ken Bernards (Ancien Wines, Napa, CA). This relationship is based solely on a verbal contract.

Glenn Proctor, broker for Ciatti Company and a Sonoma Valley native like the present-day Sangiacomos, says that the Sangiacomos just "get it." He adds, "They are excellent viticulturists who thoroughly understand the wine business. The Sangiacomos value their client relationships, and understand the needs of the grape buyers and the industry in general."

Of 65 wineries that purchase fruit from the Sangiacomos, 32 wineries put the vineyard designation on their wines. This includes 23 Chardonnays, 12 Pinot Noirs, 3 Merlots, 4 Syrahs, and 1 Pinot Gris.

Greg LaFollette (winemaker for Tandem Winery, Sebastopol, CA) states, "There is no one better in the industry than the Sangiacomo family." LaFollette began working with the Sangiacomos in 1984 while he was a guest scientist at Simi Winery. He quickly recognized their commitment to producing the highest quality fruit possible and he reports that the Sangiacomo family has always taken care of his winery.

"Tandem would not exist today if not for unwavering support of the Sangiacomo family," notes LaFollette. "During tough times, the family was financially creative. They consistently delivered the best fruit possible, which allowed Tandem Winery to market their wines at the top level."

LaFollette echoes what other grape buyers say — that with the Sangiacomos, it is a partnership, not a mere business relationship. "The Sangiacomos are great farmers and terrific people," concludes LaFollette. A Tandem Pinot Noir and a Chardonnay proudly display the Sangiacomo Vineyard designation.

Looking to the future

"Our family will continue to operate as the integration of multiple generations," says Angelo. "Our emphasis is to invest in viticultural improvements in all of our vineyards and grow better grapes each year.

"Although our fourth generation are grade school age and younger, they will be welcome to be part of the family business when the time comes."

The Sangiacomo family traditions of producing premium fruit, caring for their land, successful adaptation to change, and placing high value on their client relationships have served them well for 80 years. The winegrape industry and those who enjoy drinking wine are enriched by these deeply-rooted traditions. ■

Editor's Note: *The Sonoma County Winegrape Commission gave the 2009 Viticulture Award of Excellence to the Sangiacomo family in June.*

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PERFECT STORM REVISITED

Predicting future trends and opportunities

BY Deborah Steinthal, Scion Advisors®,
Erica Valentine, Scion Advisors®,
John Hinman, Hinman & Carmichael

Over the next 24 months, consumer demand for wine will continue to grow globally and the U.S. consumer will lead the way. Industry advisors Steinthal, Valentine, and Hinman predict, "However, the wine industry will see the fallout of weak players as the strong get stronger."

The **Great Recession** has accelerated the professionalization of the wine industry. Figure 1 illustrates how wine industry A-players are adopting new business practices at a faster rate, managing more strategically, and building more financially viable businesses.

In November 2005, co-authors Deborah Steinthal and John Hinman published a groundbreaking article: "U.S. Wine Market Liberalization by 2015: Perfect storm forming," in ***PWV journal***, defining a ten-year framework for change. We predicted that interlocking dynamics — the forces of globalization, consolidation, and wine market liberalization — would drive change in all tiers of the wine industry (see Figure 1).

By 2015, U.S. wine consumers would benefit from better access to higher quality wines for the price, dramatically accelerating innovation created by the forces of competition.

Four years later, as we move into 2010, we are exploring what has really changed. The purpose of this article is to challenge our assumptions and ask ourselves: What is ahead for wine business leaders? How do we prepare for future opportunities and challenges? We also want to revisit our predictions in the context of what we are now calling "the New Road." The state of the world economy and its impact on the wine industry can no longer be referred to as a "bump in the road."

Last 24 months: New reality

By December 2007, when we published our update, A Perfect Storm Revisited (II), in *Wine Business Monthly,* the industry's largest players had continued to grow through acquisition and global sourcing. Globalization was helping to mitigate production over-supply.

More states were open to interstate shipping. Regulators, driven by wholesaler trade associations looking to control market access, were at the same time making it more complex to market and ship wine direct, legally. This was inhibiting wineries and logistics providers from building profitable new direct-shipping business models.

Over the last 24 months, notwithstanding the new legal complexities, winery direct-ship permitting and three-tier delivery models have tapped into consumer markets for premium and super-premium wines that were nonexistent even four years ago. The net effect has been to limit growth in this segment to those marketers and wineries who have heavily invested in the new technology, while also empowering consumers to demand access to premium wines in the most restrictive states.

An unexpected **Great Recession** has had the net effect of accelerating some of our predictions and slowing down other predictions. Although the real ramifications of the **Great Recession** are still unknown, many are expecting a long recovery period, with long-term impacts on consumer purchasing behavior. Some impacts include:

- The recession, interstate logistics hurdles, and a concentration of wines above $50/bottle have put small wineries in a perfect storm predicament, many reporting sales down as much as 40%.
- Big players have been reconfiguring and trimming their portfolios to grow profits organically instead of getting larger through acquisition.

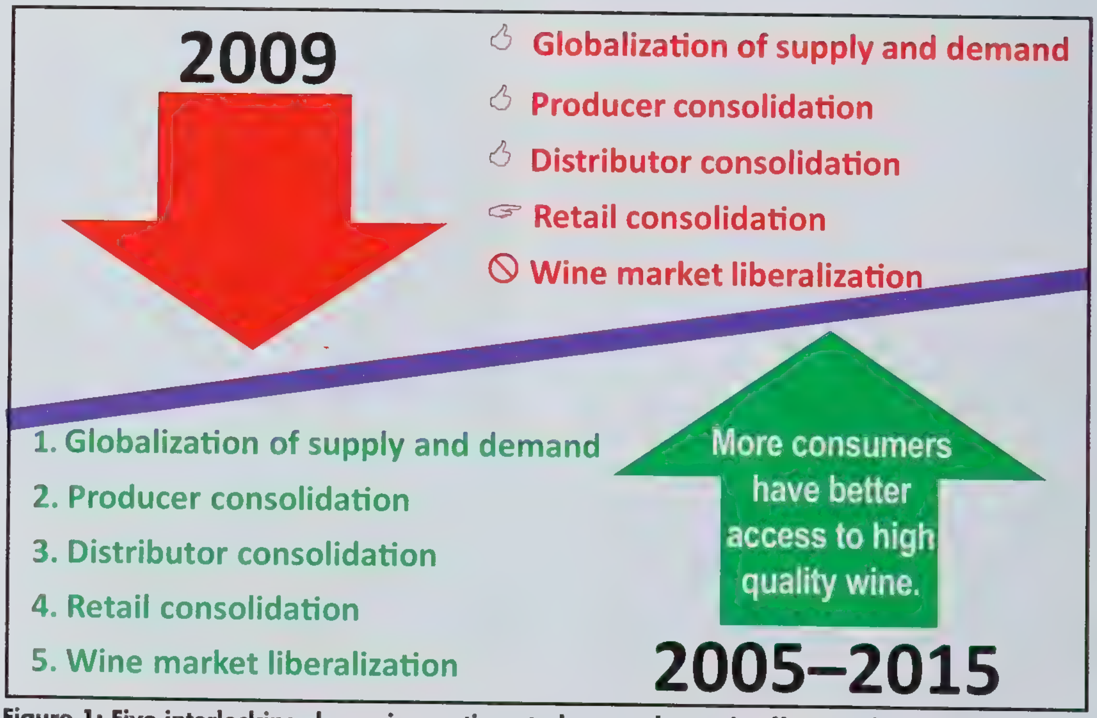
2009
👍 Globalization of supply and demand
👍 Producer consolidation
👍 Distributor consolidation
☞ Retail consolidation
⊘ Wine market liberalization
1. Globalization of supply and demand
2. Producer consolidation
3. Distributor consolidation
4. Retail consolidation
5. Wine market liberalization
More consumers have better access to high quality wine.
2005–2015

Figure 1: Five interlocking dynamics continue to have a dramatic effect on the wine industry.

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- SKU rationalization is hitting even the smallest players.
- Thousands of white-tablecloth restaurateurs have closed their doors, heavily impacting the luxury sector.
- Luxury consumerism is considered "un-American" as consumers globally struggle to keep their jobs and feed their families.
- Distributor consolidation has escalated as that segment struggled to survive in this economy, essentially shutting smaller players out of national wholesale channels.
- Worn down by industry phases and economic cycles, many more wine business owners are looking to exit sooner through sale to third parties or to the next generation (February 2008 joint report published by Scion Advisors/ Silicon Valley Bank: "Ownership Transitions in the Wine Industry.")

Figure 2: Over the next 24 months, 'A' players are building more financially viable businesses

STRONG WILL GET STRONGER	WEAK WILL DROP OUT
Pruned, profitable product portfolios	>$50 category takes long term hit
Focused, differentiated brands • Wine culture shifts as consumers seek closer social connections with their favorite brands	>100 'hobbyists' quietly close doors
Stronger, leaner teams	Thousands of jobs lost
Cash becomes king	Hundreds of equity lines close down
More diverse sales channels • Hundreds of new retail private and control labels launch • Hundreds of new consumer channels launch	Thousands of brands drop out of national distribution
Selective growth thru acquisition • Excess grape supply gets absorbed by $12–$25/bottle wine categories, driving category quality up	Hundreds of properties sell Hundreds of properties go into foreclosure
Next generation owners step up	Next generation owners drop out

Most importantly, the pendulum has shifted and the industry is more competitive and polarized than it was four years ago. Figure 3 illustrates how the large, billion-dollar producers are more aligned with the very large distribution companies and the small producers desperately need new or alternative marketing and distribution systems.

The U.S. wine market is undergoing its most difficult cycle in 30 years. As large wineries are dominating and con-

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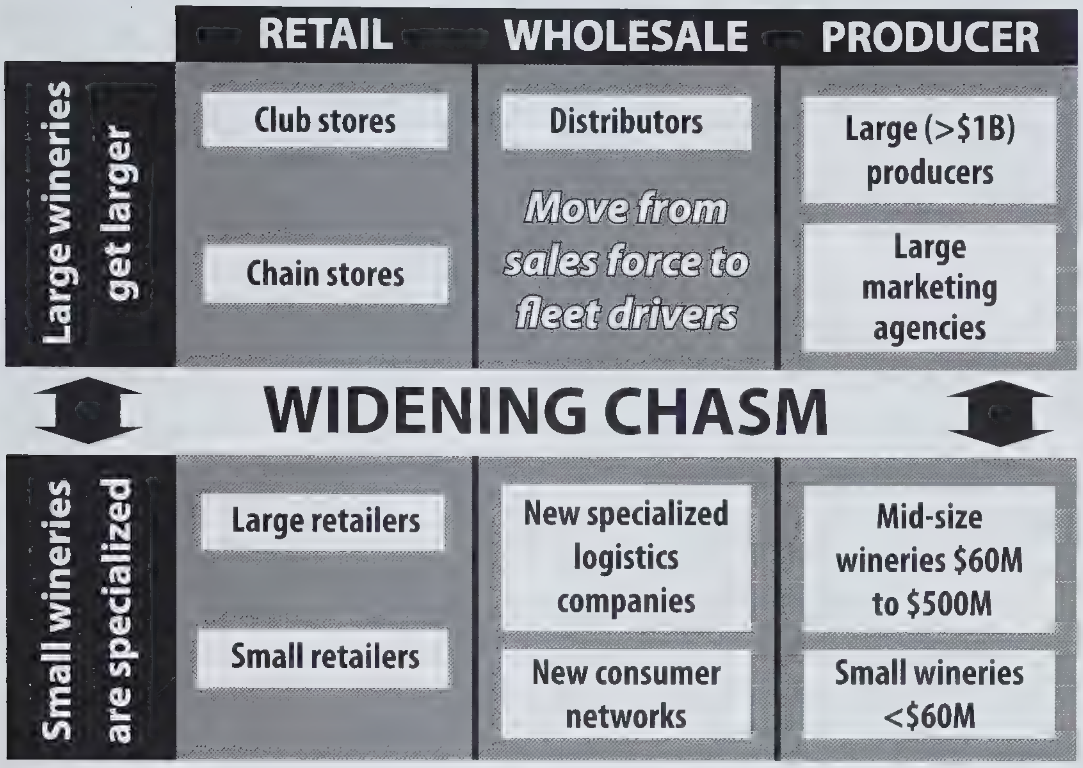

Figure 3: Pendulum shifts — small producers (under 250,000 cases) need a new distribution system.

trolling a more limited number of wholesalers, small wineries are literally being locked out, unable to sell profitably through existing national distribution channels.

Many wholesalers are heavily cash-flow-constrained due to the global economic downturn and/or debt incurred during recent consolidation dynamics. Given economic and competitive pressures, this market phase could last for two to three years.

The long-term impact of these forces is dramatic on under 250,000-case wineries, especially those with portfolios in categories above $30 msrp/bottle. Even A-players, unable to move inventories, are down 30% to 40%, and are discounting heavily.

We expect a wave of foreclosures and bankruptcies among wineries most dependent on national channels and unable to cover cash requirements over an extended down-cycle.

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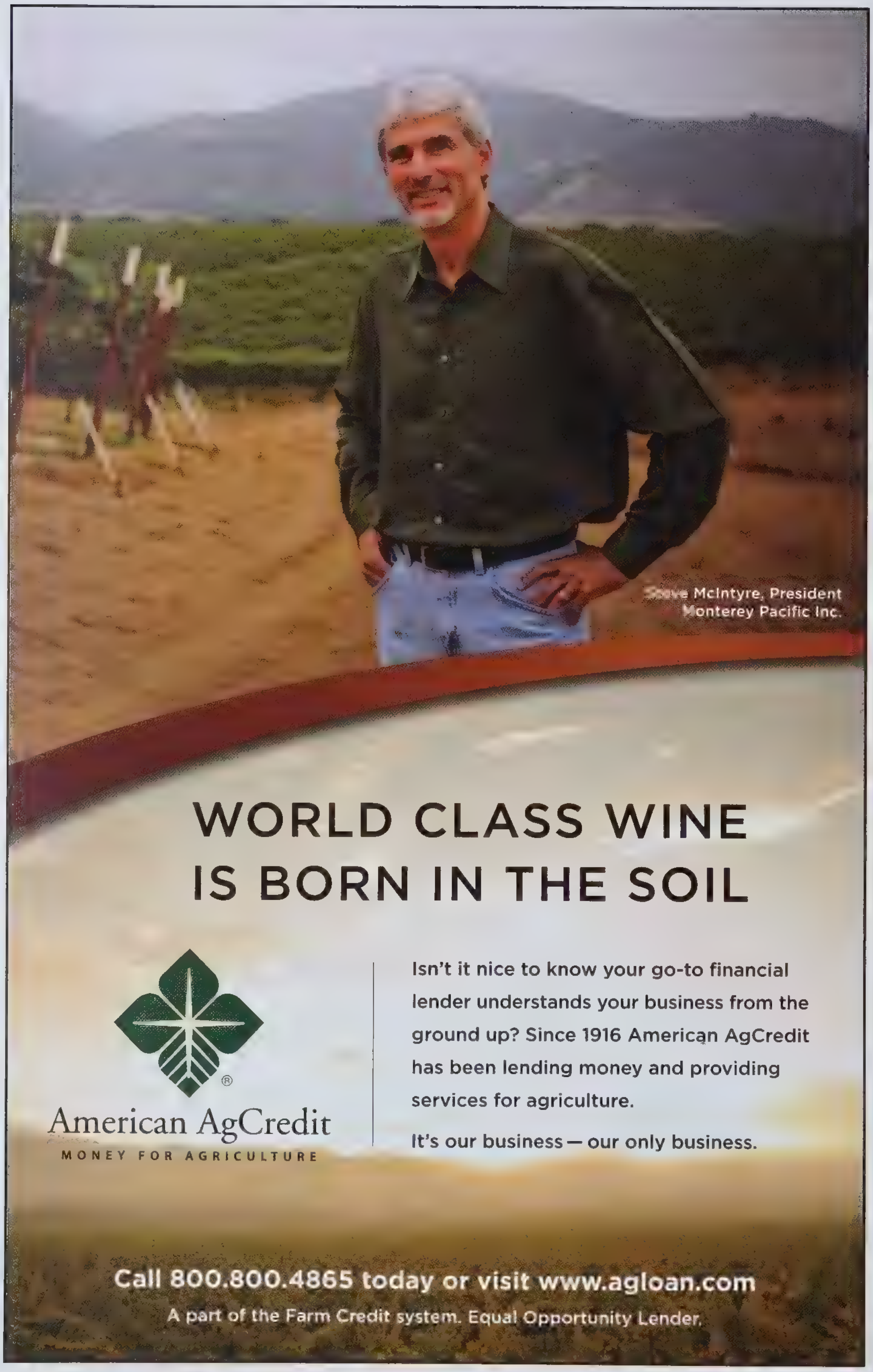
Figure 4 revisits six key predictions from our 10-year framework for U.S. wine market liberalization (Wine Market 2015).

Little has moved the business of producing, marketing, and selling wine forward more efficiently than the economy. Wine producers have not yet been able to quantify the impact to their balance sheets of either the health effects of wine or the green movement, but they are continuing to benefit from the impact of wine consumption by millennials.



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Key predictions in next 24 months: "The new road?"

Inspired by the Granholm Supreme Court judgment, the dream of deregulation has not played out in exactly the way the industry has anticipated.

We predict that by 2012 stronger players will emerge with more financially viable and technologically sophisticated wine businesses. They will provide better quality wine even more suited to today's emerging consumers, and will be positioned to take advantage of emerging marketing channels.

Rob McMillan (founder of the Wine Practice at Silicon Valley Bank), foresees rough seas through mid-2010 for producers with cash flow issues or strictly luxury-priced portfolios. "For those willing to do the hard work required to sell-though inventories over the next six months, their business should begin to stabilize by the end of 2010," predicts McMillan.

Rather than struggle through the current economic and industry challenges, more first-generation, luxury-brand owners will seek exit strategies by selling their businesses and properties rather than weathering the storm.

The biggest industry challenges are still ahead. At greatest risk are wineries without scale in the national market (under 250,000 cases) and continuing to depend on traditional marketing models that rely on distributor sales forces. The primary hurdle facing these small wineries is assessing how to profitably build sustained national sales volumes, with gross margins at least at 50% of sales revenues.

"National sales channels that contribute less than 50% margins are most likely not sustainable, especially since most wine business models are so dependent on capital-hungry assets," says Hank Salvo (Scion Advisors Partner and former Robert Mondavi Winery CFO).

Some will survive and potentially prosper by tightening their product portfolios, improving branding, and upgrading their teams and business practices. Those most likely to prosper long-term will radically change how they sell to the trade and consumers.

Looking ahead to 2012, five interlocking dynamics continue to be

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Figure 4: 2009 Reality Check

Revisiting predictions from 2007

PREDICTION: **Global wine consumption will grow from $107 billion at 5% per year (Wine Institute, December 2006).**

2009 REALITY CHECK:

- 2008 U.S. Wine consumption grew for the 15th consecutive year. Through April 2009, total wine shipments in California increased about 5 percent by volume. Millennial consumption grew by 23% in 2008.
- Wine Market Council 2008 report, and Jon Fredrickson in September 8, 2009, *Press Democrat* article: Makers of high-end wines caught in 'dead zone.'

PREDICTION: **U.S. will become the world's number one consumer of wine by 2010 (Wine Institute, Dec. 2006).**

2009 REALITY CHECK:

- For the first time, the US surpassed Italy in total wine consumption in 2008 — with 27.3 million hectoliters vs. 26 for Italy. (International Organization of Vine and Wine — VinExpo, April 2009)

PREDICTION: **Small wineries' wine sales, shipping direct, will grow from $2 billion to over $5 billion (MKF Mar. 2007).**

2009 REALITY CHECK:

- 2009 sales should be up overall with new DTC launches from major players such as QVC, *New York Times, USA Today,* and the *Wall Street Journal.*

PREDICTION: **U.S. wine industry will be appreciably deregulated by 2015.**

2009 REALITY CHECK:

- We now know that the pendulum has shifted, and wine direct sales have become a bureaucratic regulatory licensing bonanza for many states. By September 2009, it has become *more* complex to ship wine across state lines.
- Although winery direct sales data is not available, more consumers are buying wine directly from online marketers, telemarketing merchants and cataloguers than ever before. Notable: TV's QVC channel is marketing wine, WSJ.com is selling >$90 million in wine; *New York Times, USA Today* (and many more) are making their consumer database available to sophisticated wine merchants with the ability to direct ship in all channels.

PREDICTION: **U.S. wine trade policy and regulations will encourage innovation and participation.**

2009 REALITY CHECK:

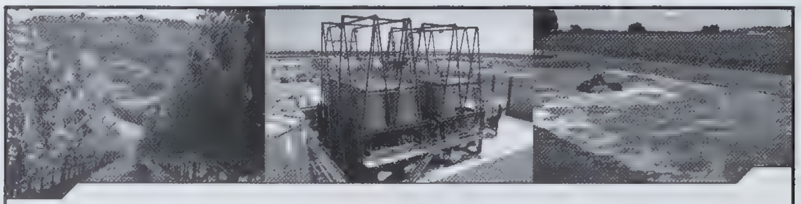
- Many initiatives are in play, and we assert that the recession will become the mother of innovation as a critical mass of smaller players struggles to succeed.

PREDICTION: **Integrated distribution models will serve large and small players, aided by new technology — driving efficiencies in production and distribution.**

2009 REALITY CHECK:

- Larger players, more able to invest in technology, are moving into integrated inventory management platforms with key distributors and customers.
- Smaller players are struggling to keep inventories on distributor floors as non-performing SKU's are dropped.
- Filling the void, new distribution business models are investing in technology enabling smaller producers to find new paths to market and ship direct to trade and consumer.
- Integrating with communications, ecommerce and fulfillment systems, experienced compliance solutions such as E-Compli are positioned to support legal shipping direct to trade and consumers.
- Now in development throughout the industry is the "integrated" business model, where one business entity combines winery, import and retail operations (legal in California), and utilizes both direct shipping and three-tier delivery to fulfill national market orders obtained from different marketing sources.

increasingly important for winery CEOs. These dynamics are straining both large and small players, forcing major operational changes along with new modes of marketing and distribution to better engage with consumers.



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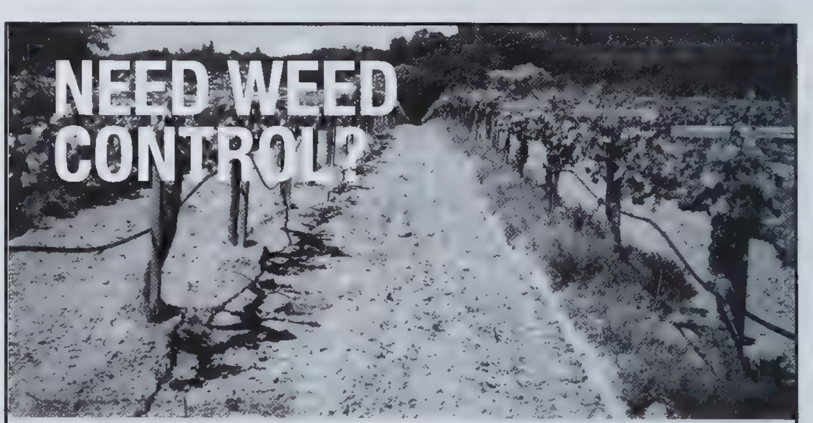

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Global grape supply pressures will exist: *There is no substitute for brand strength.*

A-brands are defined by increasingly efficient supply chain practices; established, healthy distribution channel management; and strong cash flow disciplines. Global procurement management by large wine companies, in tandem with crop reductions caused by Mother Nature, have put grape supplies more in balance with normal market trends. This will help the path to stability for growers who are positioned to weather the drop in demand for the 2009 and, possibly 2010, crops.

Contrary to industry predictions less than six months ago, oversupply is a reality everywhere — a trend that is expected to persist throughout the world. Pricing will likely continue to take hits. Growers that have catered to luxury wineries are facing drastic drops in demand. Over-leveraged growers will be in trouble when their grapes go unsold.

Large wine producers with global sourcing options will profit from the resurgence of the popular premium price point segment and are using new inventory tracking and transportation technology to profitably shift supplies from market to market. Small players will experiment with new sales channels that will maintain image and drive cash flow from higher volume and lower-priced offerings.

Banking pressures and cash-constrained businesses will limit the launch of secondary tiers, while fueling the production of private or control labels, a common trend during periods of excess supply.

Consolidation will likely continue in all three tiers: *Margins shrink on all sides; 85% of retail space will be occupied by 10 wine companies.*

a. PRODUCERS will learn to navigate a polarized wine market landscape: comprising the large, multi-billion dollar corporations on the one hand and the small to large privately held wine businesses on the other (see Figure III) — each operating quite differently and playing to different margins.

Major players Diageo and Constellation will continue to pull back from acquisitions, seek synergies from merging their multiple operating units in 2009, and focus on gaining greater control of their distributors and market efficiencies.

The top 20 wine brands will use their market presence and line extensions (and new brands) to reinforce their value to national distributor portfolios.

Chris Indelicato (CEO, Delicato Family Vineyards) says, "Wine is a hard sell because of the required knowledge base: larger wineries that can afford to field sophisticated marketing and sales teams will continue to gain market share."

The cost of promoting small producers is simply too steep for large

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distributors to afford. This is also the reason for the resurgence of spirits as a driver of distributor profit margins. Spirits are an easier sell and demand is driven by substantial producer investments in advertising and marketing.

Seeking national distribution muscle through an acquisition strategy, portfolio builders such as Bill Foley (see www.foleywinegroup.com) or Jean-Charles Boisset (see www.deloachvineyards.com) and focused private equity players such as The Vincraft Group will buy more wine brands.

According to Pete Scott (Vincraft CEO), "The acquisition of Kosta Browne Winery is just the beginning of a wine portfolio comprising small-scale ultra-premium or luxury-tier California wineries."

Competition for consumer "share of mind" will intensify in the U.S. market:

1) Wineries in every state will create new tourism opportunities and reach more consumers with educational experiences;

2) Companies like Crushpad in San Francisco (soon to be in Manhattan along with City Winery), are building on a "consumer as producer" trend, offering hands-on winemaking experiences;

3) Global competition from Australia, Chile, and Argentina will only be tempered by a weakening dollar.

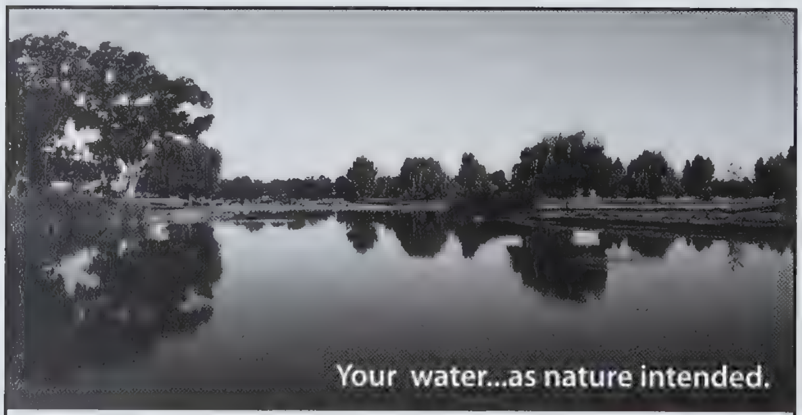
Many more wineries will experiment with evolving direct-to-trade and consumer channels and will continue to develop brands that are relevant to a new generation of consumers. New Web 2.0 tools will enable wine brands to connect to new consumer networks, build awareness, and engage consumers — and learn to staff, drive strategy, and ultimately monetize "social networking."

Rachel Dumas-Rey (CEO of Compli, a leading beverage compliance services company) says: "Over the next 24 months, wineries that intend to survive and prosper will invest in the most efficient and productive direct shipping logistics solutions. Regulatory compliance is a moving target and so key to both top- and bottom-line growth."

b. DISTRIBUTORS have consolidated from five to four major distributor houses, leaving most mid-size wineries in a worst-case situation. Over the next 24 months, the three-tier distribution system will become even less available to small players. Small wine businesses will continue to seek out alternative paths to market.

State regulators will invest in technology to enforce existing regulations rather than making access for consumers easier. Renewed competition from spirits and craft beer will cut into the wine category's "share of mind" with large distributors. Pre-packaged cocktails will infringe on wine sales, with TV ads driving consumer pull at retail and eroding market share for wine.

Anti-trust will become a new legal battle front. Consolidation could



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encounter a backlash on both sides — wholesale and retail. Demand will increase for integrated logistics models. Consolidation among these models will blur the lines between logistics providers and agency or e-retail models: mywinesdirect.com; wine.com; Adams Wine Group; Inertia Beverage Group; Winetasting Network; Copperpeak, and Provino, among many others.

c. **Retailer** business models will also undergo dramatic change. Over the next 24 months lawsuits currently pending in the federal court system will force regulators to revisit discriminatory regulations that impact retailer markets. Retail powerhouses will expand very profitable private and control label offerings, and will add to the competition for the consumer "share of mind."

Brick and mortar stores such as Safeway and Beverages & More (BevMo) will be selling more wine direct than they have in the last two years. Retailers who jumped in over the past few years with direct shipping across state lines will take cautionary steps in anticipation of a more open (but still complex) state direct shipment permit system.

As regulatory bodies continue to clarify and interpret state law, we will continue to see more integrated new business models enter the wine industry over the next 24 months. More compliant e-retailer models, trusted merchants, and third-party marketing agent businesses will emerge — on the back of a new generation of wine clubs and hundreds of new consumer networks such as *Snooth, Wall Street Journal, Sunset Wine Club, New York Times,* and *winestilsoldout.com.*

Slow economic recovery will slow wine market liberalization: *Producers and retailers will scramble to understand and position for a new generation of wine consumers.*

The **Great Recession** has catalyzed a consumption shift: a largely Baby Boomer-driven wine economy will soon be supplanted by Millennials. Baby Boomers, driving growth in wine consumption for the past 30 years, will enter retirement in droves. As they adjust to fixed incomes, they will consume their cellar reserves and "downsize" their purchases, both by volume and price point.

Millennials, who will become a larger consuming population than Boomers, will pick up some of the slack. Some are already adventurously seeking out imported wines and new wines.

Nutrition, wellness, and green planet movements (biodynamic, organic, sustainability practices) have yet to prove to be growth drivers for the wine category. Consumers will continue to seek quality regardless of origin, and more than ever before, they will demand value.

ENGAGEMENTdb, a July 2009 report published by Wetpaint and Altimeter (available online at www.engagementdb.com/downloads/ENGAGEMENTdb_Report_2009.pdf) indicates that the most valuable brands in the world are experiencing a direct correlation between top financial performance and deep social media engagement. Social media already allows wine customers to share their preferences in real time, as aging media pundits become marginalized and irrelevant to today's consumers.

Over the next 24 months, wine culture will shift as consumers seek closer social connections with their favorite brands and continue to rapidly adopt social network technology to share their authentic stories.

One great example is the Benziger Winery (Sonoma, CA) 2009 harvest video, which has attracted wine tweeters and drives people to their Facebook fan page. Imagine — a Gary Vaynerchuk for each winery!

Social media could make direct-to-trade programs even more viable if wine fulfillment and distribution challenges can be worked out cost-effectively. Liberalization will open up slowly as permits get easier to acquire and as states understand the tax value of eliminating caps on consumer shipments.

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Wine has become mainstream and is now an American tradition. While many wine industry leaders would say that today they have a "tiger by the tail" and chaos prevails, we still hold by our analogy:

> "A perfect storm gathering has generated monumental change, and by year 2015, the wine and alcoholic beverage distribution system will be more efficient, and more unforgiving of failure, than it is today.
>
> The challenges are now multifaceted and more complex than ever before: regional, national, and global in scope. They include legal, political, and cultural developments. The speed of change is accelerated by economic drivers, technological innovation, and the forces of globalization."

How to prepare for opportunity: Strategies strong players are adopting

Rather than just "battening down the hatches," well-positioned wine business leaders are supporting their crew with tools, training, and other lifeline supports to ride out the storm. Strong and strategically focused leadership is vital in steering wineries through these challenging times. Here are some important practices and strategies to consider:

Everyone on deck. Everyone at small and mid-size wineries should be actively selling, on the road and in person, in constant communication with the trade, brokers, distributors, consumers, and the media, through traditional means and the rapidly expanding online network communities that includes social media and bloggers.

Increase productivity by developing your team. With more talent available during this recession phase, consider hiring stronger, more productive people; investing in better communications and systems; and developing improved execution practices.

Drive cash flow and profits. Large or small, every business team should conduct an annual objective review of their product portfolio strategy, aligned with market opportunity. Each wine must be rationalized with an understanding of cost of goods, margin and overall performance to ensure it is delivering a sustainable return — or phased out if it is not.

Grow your competitive advantages. In a highly competitive market, most wineries need to assess and improve customer/consumer relationship management systems and disciplines; expand use of market and customer information; and support constant improvement processes around production, packaging, distribution and supply chain.

Investigate new ways to convert your customers to brand advocates. Every brand needs to figure out how to

Continued on page 71

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REDOX REDUX

PROBING WINE'S ANTI-OXIDATIVE POTENTIAL

BY Clark Smith

Modern techniques have brought terrific progress to wine production since World War II, resulting in increasingly sound and well-made wines. Yet modern practice has surprising blind spots. In this column, Don Neel (PWV publisher), is giving me the opportunity to explore a post-modern view of winemaking, assessing what we have gained and lost in the modernization process.

A compelling example is our shallow understanding of reductive strength. Stacked up against the routine measurements of pH, TA, alcohol, VA, and free SO_2, perhaps the single most important thing a winemaker can know about a wine is its anti-oxidative properties. These dictate a wine's resiliency to oxygen exposure, its aromatic openness, and its longevity potential — how good it tastes right now and how well it will cellar.

What could be more important? Yet this characteristic, central to aromatic expression, sensory defects, shelf life, and cellaring choices, is never measured and seldom even considered.

At U.C. Davis, Professor Vern Singleton tried for decades to interest students in manometric oxygen depletion. When I arrived at the Department of Viticulture & Enology in Wickson Hall in 1980, I discovered, parked under the first-floor stairs, an oxygen uptake analyzer Singleton had abandoned after trying to interest students in its value.

Manometric oxygen depletion was originally adapted to wine analysis in a 1929 doctoral dissertation by Jean Michel Ribereau-Gayon, later successor to Louis Pasteur as the Director of the University of Bordeaux. That is 80 years ago. Yet his study remains in obscurity today despite its central importance to winemaking.

Open and Shut case

Any observant winemaker or attentive wine collector knows that young wines, especially tannic ones or minerally ones, exhibit aromas that are "closed." That is, they have less apparent fruity intensity than they develop later in their lives, and often, in youth, reveal greater flavor intensity on the palate than in the nose.[1] They may even produce sulfides in youth, which ageing will dissipate.

Oddly, wine ageing is easier to explain to the novice than to the modern enologist. Randall Grahm of Bonny Doon Vineyard (Santa Cruz, CA), taught me how to speak about it plainly to normal people: Wine is a living thing. It has *chi*, the Chinese life energy. When it is young, it is best served to exchange *chi* with the world around it. When it is old, it must guard its *chi*. Life energy diminishes during ageing, so starting out with an excess is a good thing. It is like testosterone — if your 15-year-old son has no pimples, he may not be happily married at 65.

That kind of talk will freak out academically-trained enologists. The topic I am discussing is "reductive strength," or the somewhat more digestible term "anti-oxidative power," oxidation and reduction being opposite directions on the same street.

Despite its value, this area of study receives almost no attention in the winemaking community. Instead, longevity is linked to indirect measures like pH, without regard to differences in composition and style goals such as between Sauvignon Blanc and Cabernet Sauvignon, for example.

Singleton's white elephant under the stairs was a Warburg ("**vahr**' berg") apparatus, which measures O_2 uptake. Inside the enclosed Warburg flask, a vacuum is created by chemical or biological activity, which consumes oxygen over time. Invented by Nobel laureate Otto Heinrich Warburg,[2] it was originally intended to assess the viability of incubated tissue slices, but soon found broader interest, including in winemaking.

Warburg's device is used today to measure a sample's Specific Oxygen Uptake Rate (SOUR),[3] (the speed with which oxygen is initially taken up), by clocking vacuum buildup with a manometer and a stopwatch. More valuable for wine, a Warburg device can also estimate a sample's total oxygen uptake potential.

Total uptake and initial consumption rate are only loosely related. In Bob Dylan's immortal words, "How much abuse will you be able to take? There's no way to tell by your first kiss."[4]

Reviewing the basics

Oxidizing agents take up electrons, while reducing agents contribute them. This puts redox on the same footing as acid-base chemistry, an acid being a compound that contributes a proton (H+) and a base being a compound that takes up a proton.

We have two ways of talking about acidity: pH and TA (titratable acidity). A wine's pH measures the concentration of free, dissociated protons as a fractional power of 10. (The protons are like cops on the beat.) Its importance is as a speedometer of ageing; it has little impact on taste.

TA measures all the available acidic protons, whether free or bound. (These protons are like cops on the payroll.) Tartness accompanies a high TA. TA and pH are only loosely related, and it is possible to have a wine with a high TA and also a high pH, or lots of titratable protons but a low concentration of free protons, leading to a wine that tastes tart but spoils fast.

To one extent or another, wine gobbles up oxygen. We can speak of a wine's current reductive rate, its momentary oxidative state, and its total reactive potential over its lifetime. The momentary degree of reduction can vary day to day, and is related to the free concentration of readily available electrons, also known as the rH, or redox potential. Lifetime oxidation potential is analogous to titratable acidity, because it addresses the total reactive capacity of the wine.

But in acid-base chemistry, things happen quickly. This is where our analogy breaks down. Acid-base reactions come to equilibrium instantaneously, making it possible to titrate rapidly to an endpoint. TA is the acid taste right this minute. Not so for oxidation-reduction reactions.

The reactive chain of wine oxidation takes years to sort out, because the fastest reactions are not the most kinetically favored. Electrons initially form free radicals with the most reactive species around (often oxygen or hydrogen), and over time, these attack other species, eventually resulting in oxidized flavors, browning, and biological activity. The process is very slow.

Within one year of Warburg's invention, Ribereau-Gayon's 1929 inspiration was born of the realization that phenolic oxidation is accelerated by raising pH. We now know that the reactive species is the phenolate ion, which is present at high pH, with a pKa[5] of about 9.0. By shifting the wine solution to pH 12, complete oxygen uptake occurred within hours rather than years.

Later, Singleton painstakingly showed that the accelerated reactions in a Warburg apparatus were not as complete as they would be if the reaction proceeded slowly at wine pH; that is, the total amount consumed at high pH was never as much as the same wine would gobble up in its natural course. But as an index, the method proved very useful, because when comparing one wine to another, the relative consumption of oxygen gives a useful indication of overall longevity and fragility to oxidation.

Despite its commercial utility as a quick-and-dirty bellwether, a careful scientist like Vern Singleton was not enthusiastic about pushing the method as a non-quantitative index. What was needed was for winemakers to take the practical hint and incorporate the index into their routines on their own.

But as it turned out, no dice, and here we are 30 years later without any clue about what Singleton was driving at. Forces are converging today to engineer a global winemaking train wreck centered around our ignorance of reductive strength: ripeness, screwcaps, organics, and complex oxygenation effects can produce results that are painful but instructive, challenging our understanding of how wine works.

The secret life of wine

Due to complex electrode interactions, redox measurements of wine are notoriously difficult to obtain, and so far there is no standard method. The reactive redox ladder is subject to kinetic inhibition, easily disturbed by measuring devices, and useful numbers are never wholly reliable. Ask any collector the true test of age worthiness: "Only time will tell."

It is said that the Eskimos have no use for the word "snow." They need richer distinctions: powder, slush, black ice. In the same way, we should try to avoid lumping together disparate styles as "wine," and recognize that the characteristics of Riesling and our goals for market acceptance bear no resemblance to those of Cabernet Sauvignon.

However the post-WWII revolution that introduced reductive winemaking to Riesling has been equally applied to Cabernet, with disastrous results. The Germans invented reductive winemaking in order to preserve freshness in Rieslings, and then conned the French into following suit in Bordeaux, where under Emile Peynaud's scientific system, oxygen suddenly became the enemy of all wine.

Tannins require oxygen for proper evolution. This is the basis of chocolate making, where it is called "conching." The highly phenolic cocoa extract is pumped around and falls in sheets, which expose sufficient surface for continual O_2 saturation, feeding the building of structural colloids through controlled, limited oxidative polymerization that absorbs tremendous quantities of oxygen. The result is dark chocolate, which retains the bitterness of cocoa but is profoundly hard rather than harsh. If milk protein is then added, these polymers cooperatively bind, reducing astringency and creating the soft mouthfeel we associate with milk chocolate.

Concomitant with its structure-building effects, precision micro-oxygenation

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(MOx) allows winemakers to measure, without additional equipment, the speed with which oxygen is taken up.[6] A wine that will consume 4 ml/liter/month (sometimes called a "barrel equivalent" because a barrel gives about 1 ml/L/mo) will drop 0.1 ppm per day. At the moment of dryness, a typical Cabernet will consume around 60 times this amount, which means it can deplete a saturation of 8.5 ppm dissolved oxygen (D.O.) in a few days, and, if protected from oxygen, will become quite reductive.

The same wine a few months after SO_2 addition will have decreased its O_2 appetite an order of magnitude, and a couple of years later will reach a point where it cannot even consume what the barrel is giving it (1.0 barrel equivalent). Volatile acidity (VA) will begin to increase as *Acetobacter* is provided available oxygen to feed its metabolism.

Grapes submitted to extended hangtime will behave entirely differently. When challenged with oxygen immediately post-fermentation, rather than taking 60 barrel equivalents (BEQ) for a month, they might take 30 BEQ for three days. Thus 90% of a wine's reductive strength can be lost due to field oxidation, robbing a decade of cellaring longevity in three weeks of field oxidation on the vine.

The over-rated reactant

In the absence of catalysts, oxygen is actually a very poor oxidizing agent in wine. It will raise redox levels, but is not very reactive. In 1986, Singleton published the mechanism of phenolic reactivity, the famous vicinal diphenol cascade,[7] which, in a nutshell, stimulates covalent bonding of unoccupied positions on a phenol ring containing two adjacent –OH groups (and spins off hydrogen peroxide as a side product). Species bonding to the ring include an anthocyanin, another diphenol, a sulfide such as H_2S, ethyl mercaptan, or a sulfur-containing peptide.

In each case the vicinal diphenol is recreated to react again, except the alkyl substitution of the ring lowers the pKa of phenolate oxidation from about 9.0 to 8.5, effectively doubling reaction speed. This explains Ducournau's surprising early discovery that oxygenated wines at first **increase** in reductive strength. Feed a wine oxygen and its appetite increases. It is like bodybuilding — do it right, and you get stronger, not weaker. Oxygenation is not oxidation.

Lees

Phenolic reactivity is not the only source of reductive reactivity. An active fermentation can consume a saturation in hours. But post-fermentation yeast breakdown products such as cell walls, fatty acids from cell membranes, and various proteins and peptides, are also extremely effica-

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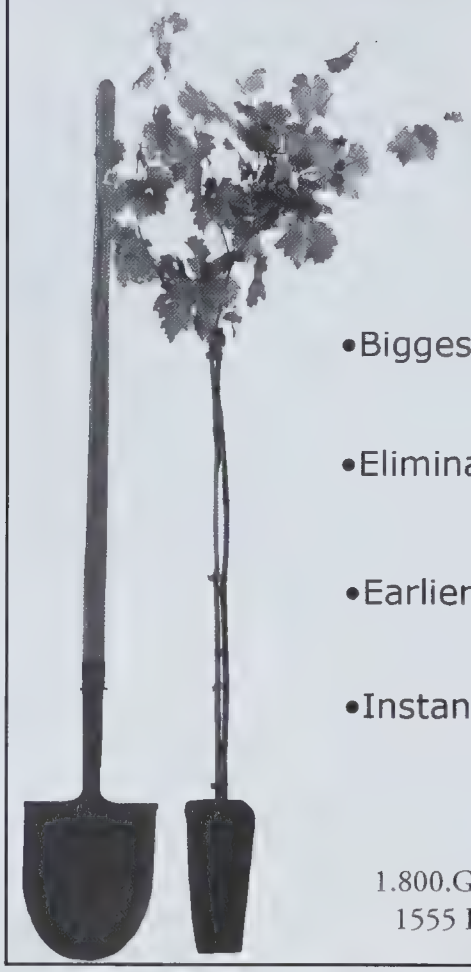

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cious in gobbling up dissolved oxygen. In my experience, their effectiveness depends on how much is in suspension and how much cells have broken down. Lees influence can be profound. White wines with nine months of bâtonage can take five years to come around in the bottle.

Minerality

Here is enology's most unfortunate and promising intellectual mud wrestling arena. On one hand, minerality is an obvious trait acknowledged by connoisseurs and the preponderance of winemakers. On the other hand, we have no idea what it is, and it retains the academic status of "bigfoot" and "flying saucers."

Let us split those hairs another time. For now, you have my testimony that a telltale buzz in the finish, apparently associated with either special bedrock or with living soils, seems to add reductive strength to wines when we MOx them.

Lees and minerality as sources of reductive strength have never, to my knowledge, been investigated with a Warburg device, and it is not clear to me whether high pH conditions would accelerate these reactions in the same way phenolic oxidation is speeded up.

Opening our eyes

Trouble is brewing on these issues. As we learn how to pick grapes at proper maturity, we intensify phenolic vigor. Add to this sophisticated lees stirring techniques, increased minerality associated with minimum tillage, and other enlightened viticultural practices, along with the trend toward screwcap closures, and the likelihood of wines that do not show well in youth looms large.

Awareness of reductive strength, and perhaps a Warburg device in your winery lab, is a good way to start diagnosing problems before the marketplace does it for you. ■

Footnotes

[1] One contributing cause for this phenomenon is undoubtedly the aromatic masking that occurs when such wines produce aromatic sulfides such as H_2S and mercaptans (known outside the wine industry as thiols). It is also likely

that in their reduced state, fruity elements such as Maillard reaction products (hazelnut, tawny port, bacon) are positively charged (N+ groups) and therefore non-volatile, but when oxidized, accept an electron and become charge-neutral and thus released from the polar aqueous solution into the aroma.

[2] http://www.jewishvirtuallibrary.org/jsource/judaica/ejud_0002_0020_0_20616.html

[3] http://www.ne-wea.org/LabManual/sour.htm

[4] from "Sweetheart Like You" on *Infidels*: "What's a sweetheart like you doin' in a dump like this?"

[5] pH at which ionization is 50%.

[6] A frustration academics have encountered in studying Ducournau's methodology is that suitable methods to automate wine treatment have yet to be developed. Sensory assessment of aldehyde, sulfides, and the openness or closedness of aromas have proven the simplest and most sensitive methods. Oh, no — researchers would actually need to be trained to taste!

Think of rejecting the notion that the driver of a car can navigate from A to B as scientifically unsound because the best navigation method is to look out the windshield and steer the car. Unpiloted vehicles would of course simply crash, "proving" that cars do not work! The researcher simply needs to realize that the human element — the skilled driver — is essential to such a study. The enological community's "unbiased" studies of micro-ox are similarly absurd.

[7] *Am. J. Enol. & Vitic.*, March 1987; 38: 69–77.

[8] "A survey of wine aging reactions, especially with oxygen." Vernon I. Singleton. Amer. Soc. Enol. Vitic., Proceedings 50th Anniversary Meeting, Seattle p. 323–344 (2000).

Clark Smith is the winemaker for WineSmith and founder of the wine technology firm Vinovation. He is a leading authority on the enhancement of wine structure and a vocal proponent of living soil. He writes and lectures widely on an innovative view of winemaking portrayed on www.grapecraft.com.

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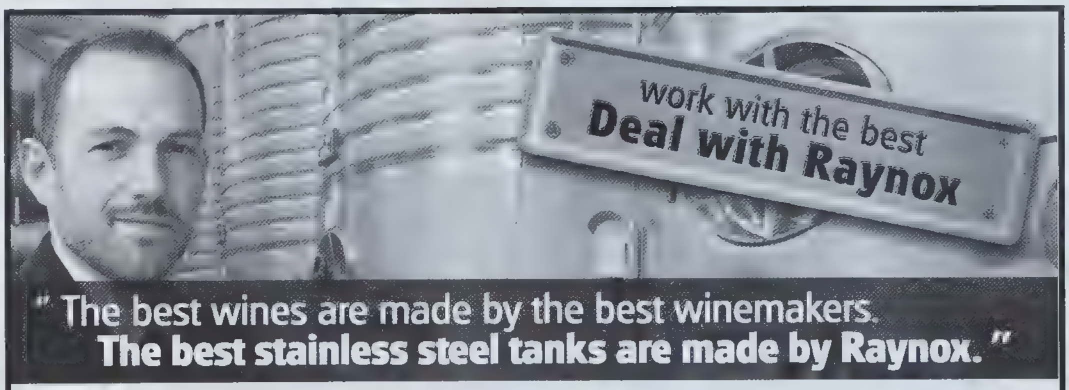
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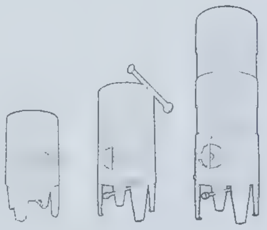

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WINEMAKING

Monitoring microbes during cellaring/bottling

BY **Lisa Van de Water, Vinotec Napa**

After yeast and malolactic fermentation have completed, and wines settle down for varying periods of cellaring in tanks or barrels, they are still susceptible to spoilage microbes. Some of these are aerobic; some are anaerobic and do not require oxygen for their metabolism.

At bottling, wines should be evaluated carefully for microbial stability, to decide whether filtration or other bottling preparation options are necessary. Bottling wines with active microbes, and with substrates to nurture them, risks disaster. Aerobic microbes are seldom a problem in the bottle, but anaerobic microbes may wreak havoc.

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*Please see "Monitoring Microbes During Fermentation," (**PWV** Journal, September/October 2009) and "Spoilage microbe population fluctuations during winemaking — causes, effects, solutions" by Robert Tracy (**PWV** Journal, May/June 2009).*

Cultures of contaminants from bottling line

MICROBES IN THE CELLAR

Microbes to watch out for: *Dekkera/Brettanomyces*, film-forming yeast (e.g. *Pichia, Candida*), and *Acetobacter*, and lactic acid bacteria; if residual sugar is present, *Saccharomyces* and *Zygosaccharomyces*

Danger signals: Unexpected change in color, aroma, or flavor, CO_2 production, film on surface, clouding of wine that was clear, pH change, volatile acidity (VA) rise, 4-ethyl phenol (4-EP) and 4-ethyl guaiacol (4-EG)

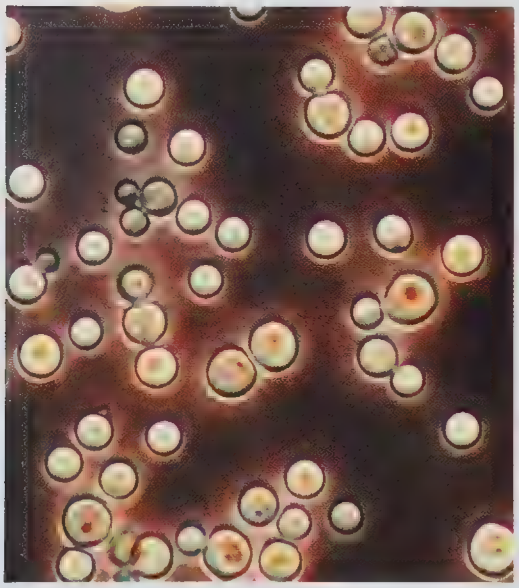
Monitoring methods: Sensory evaluation, microscopic exam, culturing, polymerase chain reaction (PCR)-based genetic techniques

Dekkera/Brettanomyces

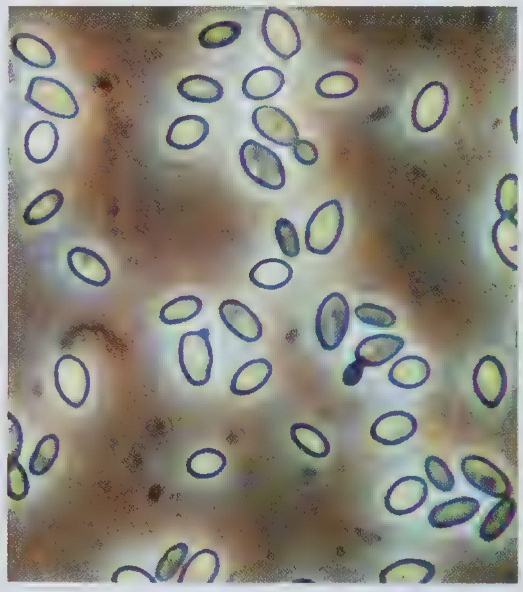
We use the name *Brettanomyces* for the physiologically and morphologically disparate group of yeasts that comprise the species best known as *Brettanomyces bruxellensis*. Some yeast taxonomists consider all the wine-related yeasts to be the sporulating form *Dekkera bruxellensis,* the sporulating form of the same microbe (though it does not sporulate in wine). *Dekkera anomala,* found in European cider, has been isolated in fruit juice from the U.S.

Cellared wines, mostly red, are at risk of becoming infected with *Brettanomyces* in cellars that have populations of the yeast. Ageing in infected wood is the most common means of contamination, but equipment and topping wine can also spread the yeasts through the cellar. New barrels often have more active "Brett" infections because cellobiose (a byproduct of oak toasting), can support more growth, and because free SO_2 binds much more quickly in new oak.

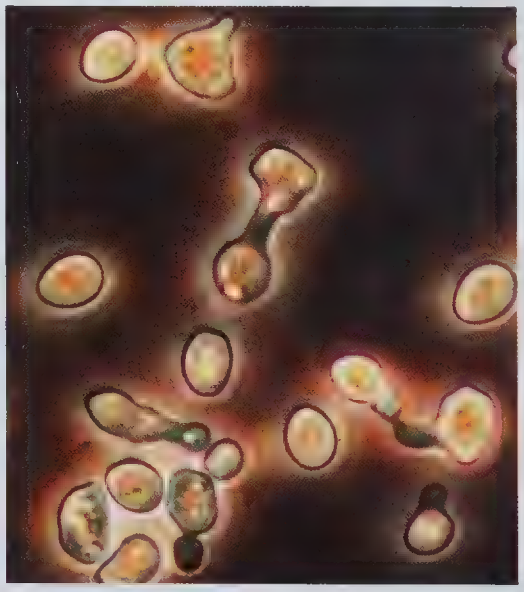
White wines are not usually infected, partly because they seldom go into infected oak, and also because they are kept at lower pH and higher SO_2 levels than red wines during cel-



Candida cantarelli (common cycloheximide-resistant cellar yeast)

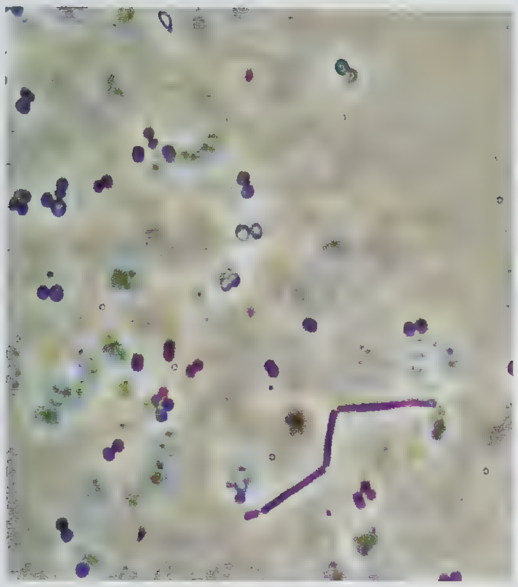


Typical cells of *Dekkera/Brettanomyces*



Conjugating *Zygosaccharomyces* and 'shmoo tips'

Photos © Lisa Van de Water, all rights reserved.



***Pediococcus* and one *Lactobacillus* chain**

laring. White wines have been infected with "Brett" when aged in shaved red wine barrels or old wooden uprights, or through winery equipment.

Brettanomyces can use residual hexose sugars but do not require them, and can grow in wines with 0.2 g/L fermentable sugar (enzymatic glucose/fructose test), which is considered well below dryness. They use a variety of carbohydrates, depending on strain, and some use alcohol as a sole carbon source.

All members of the widely varied group of *Brettanomyces* strains that have been studied can use arginine or proline (the two most plentiful amino acids in grapes), as a sole nitrogen source. Some strains are sensitive to higher levels of alcohol, but others have been found in wines over 15% alcohol. They do require the vitamins biotin and thiamine, but it is best to assume that they are able to grow in any infected wine.

"Brett" yeasts make significant amounts of acetic acid in culture, and can produce some in wine if enough oxygen is present, but a gradual rise in volatile acidity (VA) in a cellared wine could be attributable to *Acetobacter*, not necessarily to *Brettanomyces*.

At least some *Brettanomyces* strains are capable of forming the N-heterocycle compounds responsible for "mousy taint." However, lactic acid bacteria also produce these compounds and are more recently implicated as the culprits in many, if not most, instances. (See ***Lactic acid bacteria***.)

There are seldom enough *Brettanomyces* cells in a wine to be seen directly with the phase-contrast microscope (approximately 2000 cells/ml), though it does occur. The population can range from less than 1/ml to more than 10 million/ml.

The traditional method to detect *Brettanomyces* is to culture the wine on media containing 50 ppm of the antibiotic cycloheximide to inhibit growth of most other yeasts, by interfering with protein synthesis. Bacteria are not affected, so sometimes bactericides such as chloramphenicol, penicillin,

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Too Many Microbes in the Cellar?

Saccharomyces	Fermenting (unless fermentation is desired)
Zygosaccharomyces	Any in wine with residual sugar
Dekkera/Brettanomyces	Approximately 100 cfu/ml (less if population is increasing) Any seen directly under scope, especially if cells are gray not bright
Surface film yeast	More than 10 cfu/ml depending on air exposure
Oenococcus	Depends on pH and whether MLF is desired
Pediococcus	Enough to see under microscope if pH is above 3.4
Lactobacillus	Enough to see under microscope if stuck and pH is above 3.4
Acetobacter	More than around 500/ml, depending on air exposure. Any clumps or cells in wine observed directly under microscope.
Non-wine microbes	Cannot grow in wine but they can indicate sanitation problems

and streptomycin are added. *Brettanomyces* prefer media with 1.5% agar rather than 2%, and temperatures of 28° to 31°C. For some reason, they may grow poorly or not at all on WL Nutrient Medium produced in England or Europe.

Culturing detects the cells are alive and active. In optimal conditions at 30°C on WL Nutrient Medium, *Brettanomyces* forms white, hemispherical colonies in three to seven days. Recommendations for Brett management may be different if vigorous colonies are visible in three to four days than when small colonies struggle to grow after six or seven days.

Kloeckera apiculata (teleomorph *Hanseniaspora uvarum),* the major yeast on grapes, may grow in the must and cause fermentation problems, but it dies during or soon after fermentation. It is resistant to cycloheximide, and somewhat resembles *Brettanomyces* under the microscope, so it is sometimes mistaken for Brett. Some species of *Candida* and other genera, found on grapes and in cellars, are also resistant to cycloheximide.

Non-*Brettanomyces* yeasts resistant to cycloheximide tend to grow more quickly than *Brettanomyces,* with colonies visible after one to three days. In culture, *Brettanomyces* produces a strong acetic acid smell, while other cycloheximide-resistant yeasts do not. Recently, our laboratory group has also observed a commonly found cycloheximide-resistant cellar yeast, *Candida cantarelli,* and a few other yeasts in cellars and on grapes, to cross-react with some PCR primers previously thought to be specific for *Brettanomyces.* More cross-reaction studies would be valuable.

It is very important to keep track of SO_2 additions when culturing for *Brettanomyces,* because they can quickly enter a "viable but not culturable" (VBNC) state for around one to three weeks after an SO_2 addition, when they will not grow on a petri dish. These "VBNC" cells can be detected by epi-fluorescence or by PCR-based techniques.

Whether some PCR methods also detect dead cells in wine is controversial, as is the assumption that as soon as a cell dies in wine, its genetic material breaks down right away into undetectable pieces. Collaborative studies comparing methods are needed.

In summary, culturing, genetic techniques, and testing 4-EP/4-EG all provide different, and useful, information.

PCR-based techniques are much faster than culturing and detect VBNC cells which would otherwise go unnoticed. Testing 4-EP/4-EG, while lagging behind cell growth and continuing to rise after cells have declined, confirms whether or not *Brettanomyces* growth has occurred and provides a quantifiable measure of sensory effects, but does not assess viability of cells.

Film-forming yeast and bacteria

The wine surface in tanks should be checked visually at least once each week. If a film is present, sample the film by lowering a sample container on a string to the surface. A thin, slippery film is produced by *Acetobacter,* while a thick, chunky film is made by surface film yeasts such as *Candida* and *Pichia. Acetobacter* produces ethyl acetate (nail polish/airplane glue smell) and acetic acid from alcohol; surface film yeasts produce acetaldehyde (fino sherry smell), also from alcohol.

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Too Many Microbes in the Bottle?

Wine with residual sugar	
Saccharomyces	5 to 10 microbes per bottle
Zygosaccharomyces	ANY at all
Dekkera/Brettanomyces	Depends on pH/SO_2
Surface film yeast	Cannot grow after 1 week in bottle*
Lactic acid bacteria	Depends on pH, see dry wines below
Acetobacter	Cannot grow in the bottle unless closure is compromised*
Non-wine microbes	Cannot grow in wine but more than 5 microbes in 100 ml indicates bottling sanitation problems
Dry wine, pH under 3.4, no MLF	
Sacch., Zygo	Cannot grow without substrate (sugar)
Dekkera/Brettanomyces	1 to 50/ml depending on conditions and history
Surface film yeast	Cannot grow after 1 week in bottle*
Lactic acid bacteria	Depends on SO_2 and pH
Acetobacter	Cannot grow in bottle unless closure is compromised*
Non-wine microbes	Cannot grow in wine but more than 5 in 100 ml indicates bottling sanitation problems
Dry wine, pH higher than 3.4	
Sacch., Zygo	Cannot grow without substrate (sugar)
Dekkera/Brettanomyces	1 to 50/ml depending on conditions and history
Surface film yeast	Cannot grow after 1 week in bottle*
Oenococcus	More than approx 500+/ml if residual malic present; OK if no malic remaining
Lactobacillus	Seldom grows in culture but can grow in bottle if substrate is present
Pediococcus	Any visible under microscope; any colonies in culture or detected by PCR
Acetobacter	Cannot grow in the bottle unless closure is compromised*
Non-wine microbes	Cannot grow in wine but more than 5 in 100 ml indicates bottling sanitation problems

* The presence of *Acetobacter*, or other alcohol-tolerant microbes that originate in wine, can indicate a serious bottling line sanitation problem even if they will not grow in the bottle.

In barrels, check for a film at topping; resanitize the topping device before moving to the next barrel if a film is present.

With a phase-contrast microscope it is quite easy to distinguish film yeasts from *Acetobacter* bacteria. The yeasts tend to form clumps and chains. *Acetobacter* grows in rafts of small rods, mostly single or double, held together by a polysaccharide called a glia. Some of the cells resemble *Oenococcus* or *Pediococcus*, but *Acetobacter* is noticeably larger when compared to reference cultures of the other bacteria (for example, to freeze-dried *Oenococcus* used for cellar additions).

In wine, *Acetobacter* is not always visually distinct from *Lactobacillus*. However, *Acetobacter* cells are often wider than *Lactobacillus*, and taper at the ends. *Acetobacter* chains also tend to be composed of shorter cells than *Lactobacillus* though not always. In culture, though not in wine, *Acetobacter* produces strange involution forms that resemble crudely formed, lumpy snakes made out of clay. These forms distinguish *Acetobacter* in culture from other rod-shaped microbes.

In culture, surface film yeasts grow readily on yeast media, often producing wrinkled colonies, though a few species produce smooth colonies. While species can be distinguished by genetic sequencing, this not commonly useful to winemakers because the remedies (eliminate headspace, increase molecular SO_2) do not differ. The common practice of pushing the film out the top by adding wine to make the container overflow contaminates the cellar and is not recommended.

Acetobacter grows on bacterial media and on most yeast media. *Acetobacter* is a normal part of red wine

COMING IN
PW Journal
March/April

Post-bottling management of oxygen to reduce *off*-flavor formation /optimize wine style

from The Australian Wine Research Institute

Understanding how aroma compounds react with oxygen in different wine backgrounds is necessary for informed decision-making on bottling and packaging.

flora in the cellar. A large population does not necessarily mean the wine is spoiling; it means it has the potential to spoil if air is, or becomes, available.

Lactic acid bacteria

Wines not intended for malolactic fermentation (MLF) should be kept below pH 3.4, with a molecular SO_2 of at least 0.6 to 0.8 ppm. Test malic acid enzymatically before MLF to obtain a starting level; if any CO_2 or haziness occurs during cellaring, check microscopically for bacteria and test for a decrease in malic acid.

If residual sugar is present, certain *Lactobacillus* species make acetic acid from sugar, raising the VA in stuck wines, but there is no smell because they do not produce ethyl acetate. In stuck or sweet wines, monitor VA very closely and check microscopically for *Lactobacillus* every day or two. Many stuck wines are attacked by "ferocious" *Lactobacillus,* which produce acetic acid from sugar. Also monitor VA during MLF and afterwards, and if possible, test D-lactic acid, produced from sugar. Check population microscopically; lactobacilli do not grow well in culture, and PCR-based tests do not presently detect all species.

After malic acid is gone, citric acid can be metabolized stoichiometrically to produce 0.1 to 0.15 g/100 ml acetic acid. Biogenic amines, regulated by some European countries, may be produced by various lactic acid bacteria even after MLF is finished.

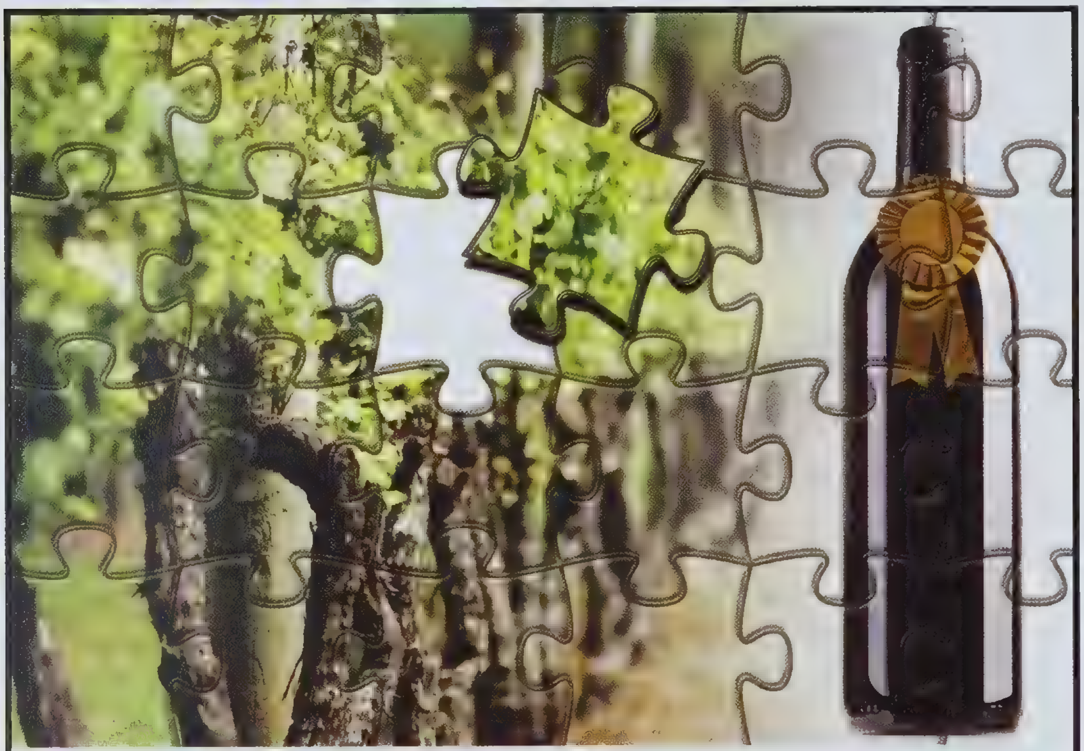
Many heterofermentative lactic acid bacteria can produce the N-heterocycle compounds of "mousiness," a rare taint characterized by a very unpleasant aftertaste of mouse urine or rancid nuts. The compounds are only slightly volatile at wine pH so the wines exhibit a "popcorn" or "basmati rice" aroma, even if the taint is intense once it is put into the mouth and the higher pH allows the compounds to volatilize. Studies have been proposed to distinguish a "transient mousiness" following MLF and cured by SO_2 addition from a permanent taint which resists curative measures.

Saccharomyces and Zygosaccharomyces

These fermentation yeasts require residual fermentable sugars. The classic minimum level for activity is 0.5 g/L measured by enzymatic tests of glucose and fructose, though this is a arbitrary concentration. Prediction of refermentation also depends on glucose/fructose ratio, so these sugars should be measured separately, not together. *Zygosaccharomyces bailii* is resistant to SO_2, sorbate, and benzoate, giving it a formidable advantage.

Both yeasts grow on unselective yeast media. *Zygosaccharomyces* cells tend to be slightly more oval than

Continued on page 80



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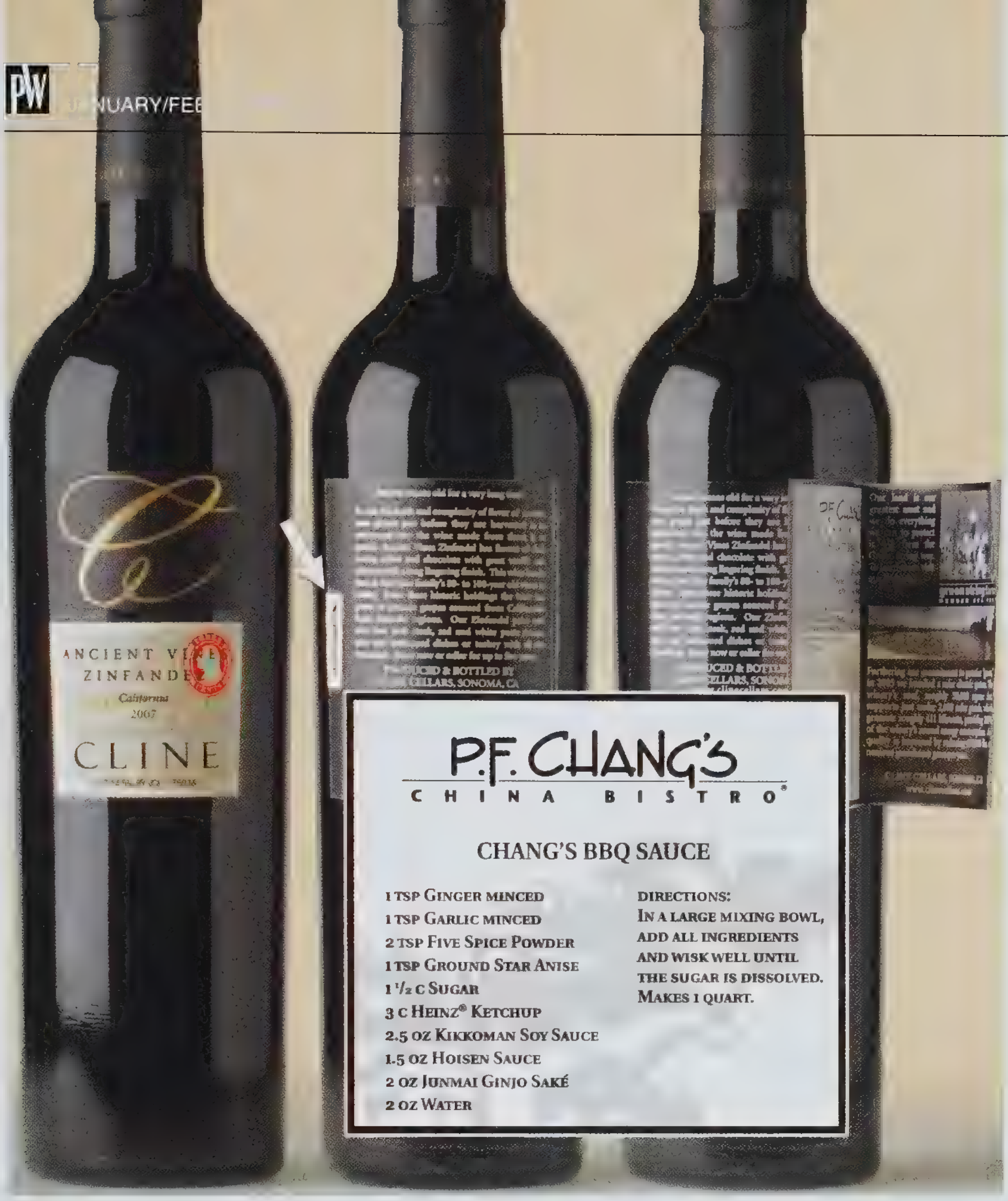

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Cline Cellars' back label peels off (see arrow to tab in photo) so consumer can retain recipe and winery information. INSET: Label panel with P.F. Chang's recipe.

Five-panel back label OFFERS RECIPE FOR brand building

BY John Giesfeldt

Storytelling, providing historical context, and giving wine buyers a personal experience help build a brand and inspire loyalty. The more detail you share about your wine, the better opportunity you have to make a personal connection with the consumer.

For Cline Cellars (Sonoma, CA) food pairing is an ideal association to establish and reinforce a personal experience with its wine — a way to deepen the brand engagement and strengthen brand building. It creates a position of leverage, and it is the push behind a dedicated section of the Cline Cellars website called "have it tonight," which recommends a range of food pairings with its Rhône-style and Zinfandel wines.

In another effort to reach out to consumers, the winery introduced a series of tear-pads at retail store shelves to present recipes that pair with its Ancient Vines Zinfandel. However, while the "have it tonight" effort played to a captive audience, retail is anything but captive. It was difficult to maximize shelf presence for the pads due to space, let alone to know for sure if a recipe actually made it home with every bottle purchase.

The retail channel is awash in clutter and noise, and cutting through is a challenge. If it is not immediately obvious to a shopper that your wine comes with a value-added component, it is lost in translation.

Cline Cellars hoped to make things as easy as possible for consumers, to help build the brand experience. With the help of WS Packaging Group, the winery switched to a new format for its back label that delivers a suggested recipe with every bottle. In late 2007, the winery replaced the standard back label for the 2006 Ancient Vines Zinfandel with a five-panel extended text label. The five panels include: front label, two images of the back label, one recipe panel, and one panel for winery promotion, all printed in black ink.

"When I saw the recipe tear-pads, I asked whether or not it might be more effective to include a recipe on every bottle by switching the standard back label to an extended text label," said Dan Hughes, senior account executive with WS Packaging Group. "I also pointed out the new back label format had enough space to allow additional information about the winery or wine."

WS Packaging had already been printing the front and back labels for Cline Cellars. Up to this point, the Ancient Vines Zinfandel had a very typical back label, combining a little detail about the wine with the standard regulatory text. Being able to exponentially expand the label space offered the opportunity to fulfill the brand promise at a higher level.

"The new back label format was an ideal way to combine a recipe for those interested in food with additional information about the vineyards for those interested in wine history," says

Peggy Phelan, director of operations with Cline Cellars. "The more information we can give our customers about our brand — the history, the vineyards, the wine, the farming practices — the better. The additional panels for copy give us another opportunity to build a connection with our customers."

This was the first extended text label application in the wine industry and WS Packaging recommended the EasyTab® label from its MultiVision® product line. The Cline Cellars labels are produced at the WS Packaging facility in Fullerton, CA.

EasyTab holds three patents and is engineered to meet the regulatory requirement that allows consumers to open, read, and reseal the label. Its patented pre-curve is designed for tight-diameter surfaces, and avoids edge lift and wrinkling when machine-applied. It has a consumer-friendly "peel tab" that protects overall package integrity.

"The multi-panel format allowed us to tell the story in detail about our Ancient Vines Zinfandel by sharing a recipe that pairs with the wine," says Charene Beltramo, marketing director at Cline Cellars. "It also allowed us to tell the story about our change to green business practices."

The base ply stock is 55-lb. white semi-gloss supplied by the Fasson Roll North America division of Avery Dennison Corporation. The middle and top layer are raw 60-lb. coated two-side white semi-gloss from a proprietary supplier. The base label also has a proprietary varnish that acts as a release liner for the top layer, which has a 2.0-mil polypropylene matte clear film over-laminate.

The EasyTab pressure-sensitive labels are applied with an existing twin-station, roll-fed Cavagnino & Gatti rotary labeler. No additional equipment is needed, which keeps costs to a minimum and production speeds high.

"We spent a lot of time thinking through the project with our production team," Phelan adds. "We did make changes to the design to ensure the label would work with our labeler. We tested different adhesives. When the day came to bottle, we were confident there would not be any problems, and there were none."

Construction of the label and the way it is printed allows Cline Cellars to incorporate different panels/different copy in every run. This flexibility allows the vintner the option of easily incorporating new content.

"We are pleased that we are one of the first wineries to introduce this type of label to wine consumers," Beltramo adds. "Fred Cline is a pioneer in many ways, such as his push to grow and produce little-known wines like Mourvèdre, Carignane, and Viognier, and this new label continues that tradition."

In an effort to further expand the consumer experience, Cline Cellars

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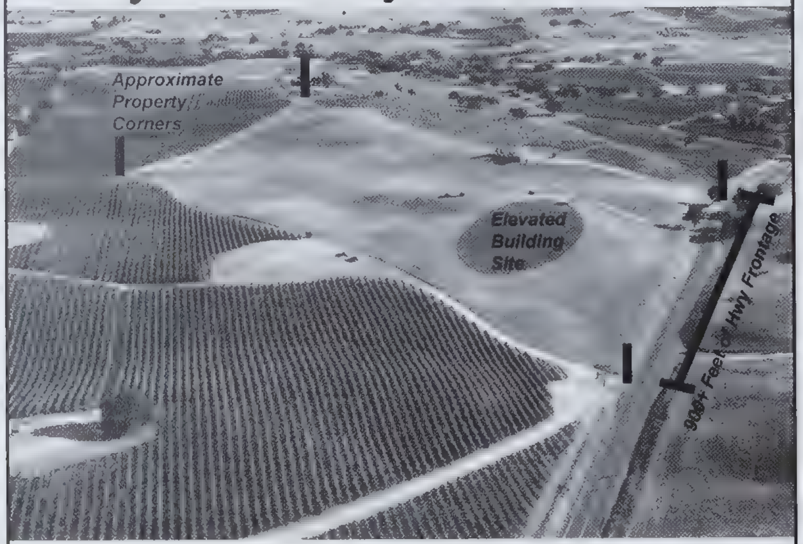

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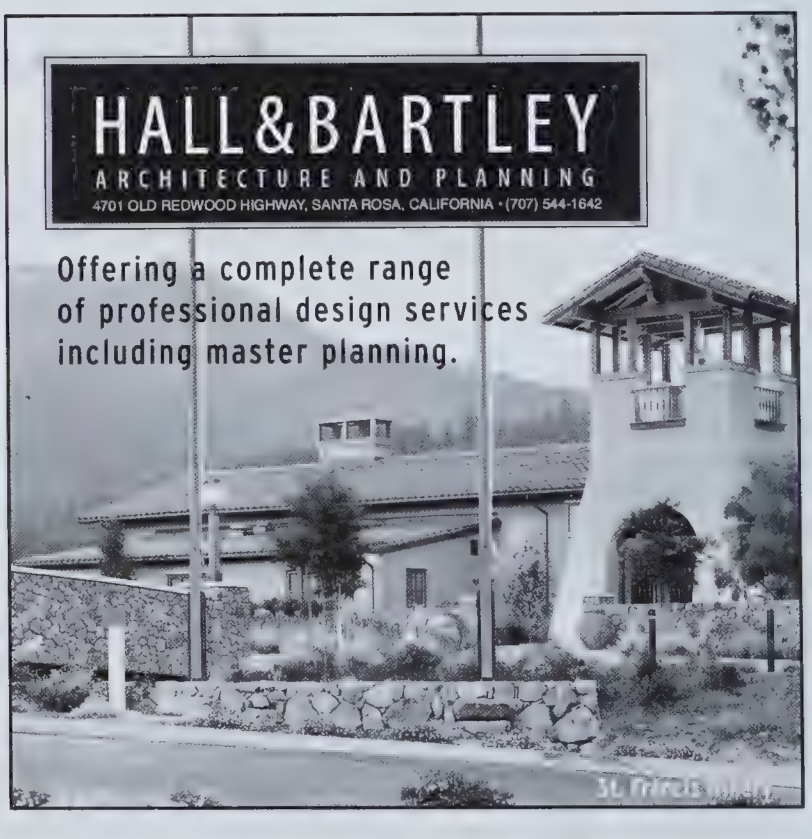

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presented its extended text label recipe program to P.F. Chang's China Bistro. The chain of 195 restaurants in 38 states provided the winery a special BBQ sauce recipe to accompany the 2007 Ancient Vines Zinfandel that can be used for dipping, grilling, or as a marinade for seafood, beef, or chicken.

"We submitted a recipe (unavailable in our China Bistros) that would pair well with the wine," says Mary Melton, P.F. Chang's beverage director. "Customers love the tear-off recipe. It gives them the name of the wine, so there is no more writing on cocktail napkins."

In the P.F. Chang's test kitchens (Phoenix, AZ), Melton worked with chefs to create a recipe easy enough to prepare at home (the BBQ sauce in the restaurant takes several hours to make), short enough to fit on the label, and with a flavor profile to match the wine. Melton suggests to use grilled chicken with the special BBQ sauce to achieve an ideal pairing with the wine.

"In Asian restaurants that serve a variety of entrees in family-style such as P.F. Chang's bistros do," adds Melton, "customers do not practice food and wine pairing so specifically as they might in an Italian restaurant where each patron is only eating one dish.

"When we submitted the first recipe we did not really think about how long this program would run, but it is working so well for Cline Cellars and for P.F. Chang's, that we will continue with sauces for grilling and dipping at home. People are ready for another recipe so they can start collecting them. Playing with the sauces is a great way to share great food over a bottle of wine."

Cline Cellars' next pairing with P.F. Chang's will be a new recipe for sweet-and-sour sauce with the 2008 Ancient Vines Zinfandel (50,000 cases).

The success of the back label for its 2007 Ancient Vines Zinfandel, which included one recipe, encouraged the winery to add the extended text label to its Ancient Vines Carignane and Ancient Vines Mourvèdre. The 2007 Carignane features a recipe for sun-dried cherry jam from the Woodfire Grill (Atlanta, GA). The 2007 Mourvèdre features a recipe for hazelnut-and-peppercorn-crusted tenderloin of beef from the girl & the fig™ restaurant (Sonoma, CA).

"I was flattered when Charene Beltramo asked for a recipe for a wine label," says Sondra Bernstein, CEO/proprietor of the girl & the fig. "We love working with Cline Cellars and have been carrying their Rhône style wines since they were available. I picked a recipe from our cookbook that I thought would work well with the Ancient Vines Mourvèdre (one of five Mourvèdres on the wine list and offered by the glass).

"The program validates the relationship between the restaurant and the winery, and the lifestyle of food and wine pairing. I would not do this with just any winery. Cline Cellars is a property that I respect; I like the wines very much.

"We have always been very free with our recipes," Bernstein adds. "In our cookbook, I offer other suggestions to accompany Mourvèdre: Grilled Fig Salad with Fig and Port Vinaigrette [served all year with fresh or dried figs], Braised Beef Short Ribs, Braised Lamb Shanks, Wild Mushroom Risotto, and Wild Mushroom Ragout."

Beltramo reports the consumer feedback has all been positive, and the winery is exploring additional restaurant and recipe pairings. Cline Cellars has bottled 12,000 cases of Ancient Vines Mourvèdre to include a five-panel back label and 2,000 cases of Ancient Vines Carignane.

"The recipes, information about our farming practices, and history of our vineyards allow us to share so much about wine culture," Beltramo says. "Whether the consumer is new to wine or a full-fledged enthusiast, the extended text label lets us tell a much more complete story about our brand and what is behind it." ■

For more information on multi-panel format labels, contact WS Packaging Group at 877/977-5177 or marketing@wspackaging.com.

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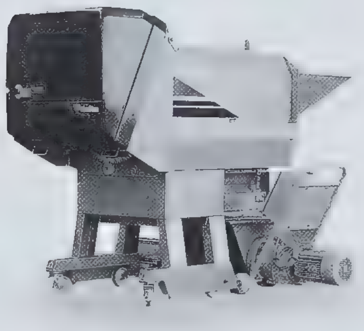
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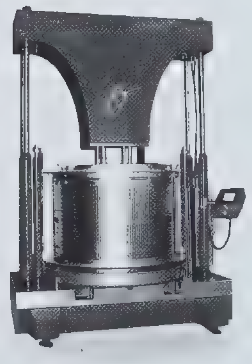
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Recycling realities of wine packaging

BY Paul Smith,
Manager of Global Sourcing for Cullet, O-I

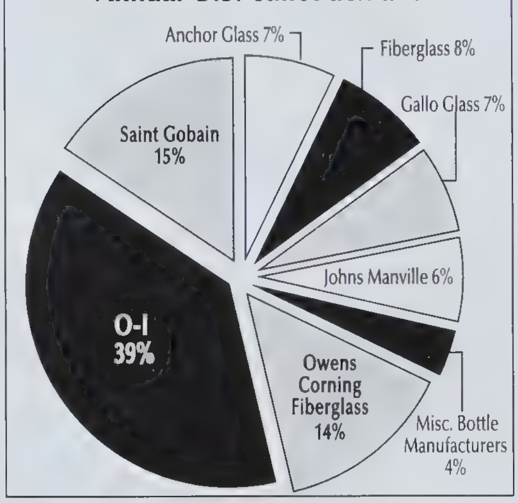
Many vintners are looking at the recyclability of the packaging used for their wines to decrease the environmental impact of their wine business as the world collectively turns its focus more and more toward sustainability. In years past, many vintners likely were more concerned about the benefits of the wine package and the image it portrayed instead of its impact on the environment.

Today, vintners know that choosing the right wine packaging is vital — both for the quality and taste of their wines **and** for the environment. Industry research has shown that vintners and consumers value the endless recyclability of glass and care about sustainability — one study* in particular shows approximately 54% of vintners and 28% of consumers cited recyclability as "significant" in their packaging decision-making process. However, many vintners do not fully understand the details behind the complexity of the recycling process.

*(*Research commissioned by O-I, conducted by Siegel+Gale, November 2008)*

While recycling as a packaging benefit is becoming more and more important, vintners and consumers often have many questions about the recycling process, particularly when it comes to the package. **Is recycling glass better than recycling other materials?** Essentially, glass recycling is a vital function in the wine industry overall, and vintners and consumers want to learn about the steps involved.

Annual U.S. cullet demand



Total demand for cullet in the U.S. reaches close to 3.4 million tons annually. This figure exceeds actual supply by more than 1 million tons. (Source: O-I)

What happens to a wine bottle after it leaves the curb? The journey from a curbside recycling bin to a materials recycling facility (MRF) to a glass manufacturing plant varies from city to city and state to state. Because controlling recycling costs while maintaining the integrity of commodities, like glass, is a balancing act, most residential recycling programs focus on single-stream collection.

Dual-Stream Recycling

Dual-stream systems, probably the most popular form of curbside recycling in the U.S., require residents to sort containers (like wine bottles) in one curbside bin and paper products (newspaper, magazines, direct mail, etc.) in another. The bins typically are color-coded (blue for paper, green for containers, etc.).

While dual-stream recycling systems are not foolproof, the separation of glass from other recyclable materials allows for higher quality cullet than single-stream recycling. However, because this system requires more effort from consumers to sort recyclables, fewer people take the time to recycle. Thus dual-stream systems generate glass materials of reasonable quality, but at lower volumes for MRFs.

Single-Stream Recycling

While single-stream collection is one solution for large municipalities and large, integrated recycling companies, it creates challenges for buyers of recyclable goods, like O-I. In general terms, single-stream recycling is the mixing of all recyclables — sometimes even organics — at the curb or recycling container.

Single-stream collection systems tightly compact all recyclables to maximize a truck's payload. These higher compaction rates often crush the valued commodities inside, including glass, and cross-contaminate the materials. The cost saving on collections actually translates into higher costs within the MRF processing, which in turn negatively impacts the capital needed to build new MRFs that can effectively sort single-stream materials.

Unless significant investments are made to clean and properly separate the recycled materials, much of the glass and other commodities in single-stream recycling become unusable for the manufacturing process.

Consumer Deposit Recycling

A third option is consumer deposit programs, such as the system in California, that collect excellent, color-separated glass that, in turn, becomes cullet — the form of the material put into furnaces for glass containers. The program results in significantly larger amounts of quality cullet for the MRFs.

Only eleven U.S. states, however, have bottle deposit programs, leaving

Is recycling glass better than recycling other materials?

Glass wine bottles remain the most easily processed and one of the most ready-to-recycle containers in the market. Unlike other packaging materials, glass is composed of abundant natural materials — sand, soda ash and limestone — and can be recycled over and over without an impact on its quality. Because glass is chemically inert, its contents benefit from a long shelf life. Glass is ideal for those consumers and vintners focused on efficiency, recyclability, and sustainability.

PET

In contrast to glass' proficient recyclability, packaging made from petrochemical resins, like PET, is complicated and expensive to recycle into new containers. When recovered from post-consumer use, these materials are more often "downcycled," or converted from a higher-use product into a lower-use product, essentially making them single-use containers.

Multi-layer packaging

Multi-layer, paper-based wine cartons (which are becoming more available in the retail wine market) are even more difficult to recycle or downcycle. Only about 10% of the materials from these packages are able to be recovered, so it is unlikely they would reach a recycling center. The package may include waxed paper, metals and plastic layers, and adhesive materials. The tissue paper industry is one possible end-market for these cartons. However, many paper companies avoid the packaging since it can contaminate the recycling stream with unusable materials. Currently, this product is only exported to Asia for recycling so sustainability is questionable as the expense to market must counteract its value.

Bag-in-a-box

Bag-in-a-box containers used for wine are often difficult to recycle, due to the numerous materials utilized to make them. The plastic or aluminum liner inside the cardboard box is not recyclable, and, often times, the box must be broken down manually. These containers mostly become part of the waste stream, even in Europe where they were first popularized. ■

a large amount of cullet in landfills. The following states currently have bottle bills, which creates a higher quality cullet for glass manufacturers: California, Connecticut, Delaware, Hawaii, Iowa, Maine, Massachusetts, Michigan, New York, Oregon, and Vermont.

Once the bottles reach an MRF, what happens to any contaminants, labels, and wine bottle pieces (finishes) in the shipment? Glass bottles are often cleaned of paper labels and adhesives, and then high-tech camera equipment and air jets sort the glass from any remaining ceramics, stones, and metals left in the materials stream (including foil wrappers, etc.). From there, the glass is separated by color, and transported to a glass manufacturing plant.

From cullet to "Glass"

Upon reaching a glass plant, the cullet is mixed with natural glass ingredients — sand, soda ash, and limestone — melted down and re-formed into new bottles. Any additional contaminants (such as paper labels and adhesives) apparent in the cullet are typically burned off during the melting process.

Most glass container manufacturers prefer using recycled glass to make new bottles because it produces a better yield, reduces overall energy usage, lowers the emissions generated in production of new bottles, and generally extends furnace life and efficiency. Additionally, when cullet cost levels are in line with the cost of batch materials, cullet is an ideal replacement material.

In the U.S., the majority of glass manufacturing plants currently accept and use cullet. However, the color and amount of cullet used and the price paid for cullet varies by plant. Across the glass industry, there are more than 70 cullet processing

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facilities in 29 states that collect, sort, and remove contaminants from recycled glass. These processors are often located at glass manufacturing plants, but are typically privately owned and operated.

Although cullet processing facilities are not in every state, O-I's glass manufacturing plants are strategically located near large cullet providers and key customers to decrease the transportation required. Because cullet provides such energy and environmental savings, most glass manufacturing companies are working to increase the amount of cullet they receive.

"Reusing recycled container glass is critical to our glass container industry and its environmental and energy efficiency goals," says Joe Cattaneo, president of the Glass Packaging Institute. "This cullet use is also an integral part of the cradle-to-cradle aspects of glass manufacturing. We are prepared to embrace all measures that efficiently and cost-effectively improve glass recovery."

How does the recycling process impact the bottles used by California's wine industry?

There are eleven cullet processors in California, supported by high environmental awareness and a deposit system that generates high glass recycling rates (more than 500,000 tons is generated annually). The average use of cullet in California is more than 40%.

Call for Quality

Regardless of the collection program used, the fact remains that the glass industry needs more high-quality cullet to use in making wine bottles. The use of cullet reduces energy usage and emissions, reduces landfill volumes, and eliminates unnecessary downcycling. The glass packaging industry encourage everyone to join in embracing the challenge set: 50% cullet in all glass products by 2013. To meet this goal, glass manufacturers are working on three main initiatives:

- Improving collection and sorting at MRFs and cullet processors;
- Developing commercial recycling programs;
- Creating legislation to support and promote effective glass recycling.

Improving Glass Collection

The glass industry is improving the technologies used at MRFs and cullet processing plants. Due to the increased trend towards single-stream recycling, the amount of quality, non-contaminated, glass containers continues to decrease. To counter this, more use of optical sorting technology is being encouraged at MRFs and development of more cullet processing plants to remove contaminants from the glass.

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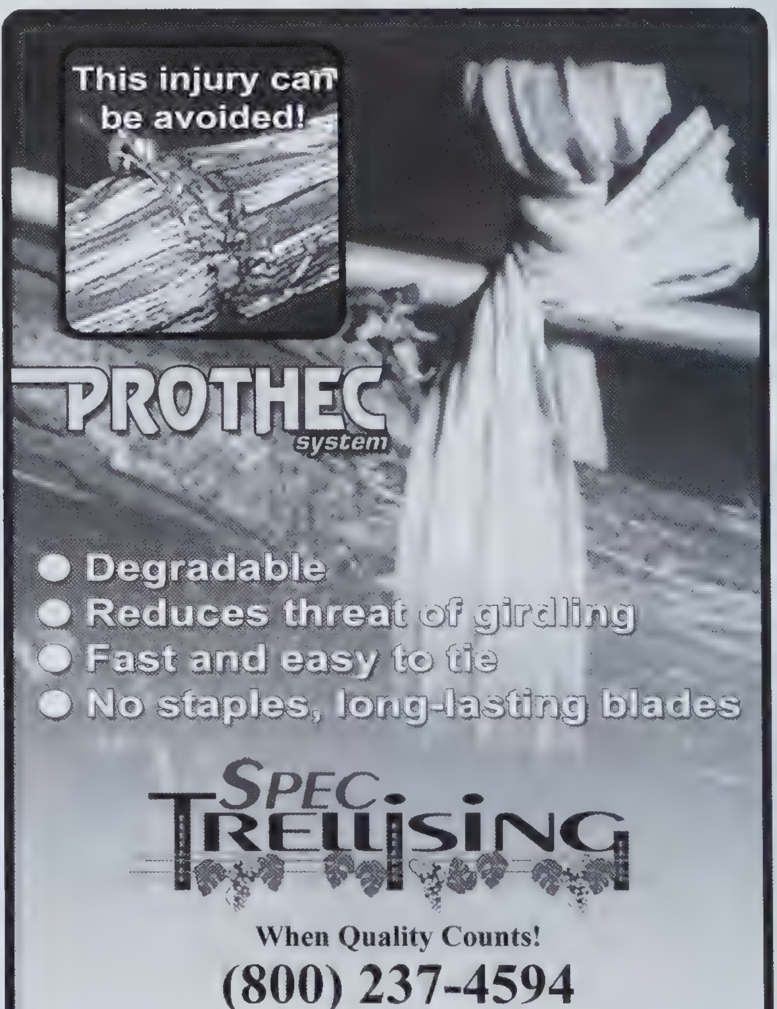

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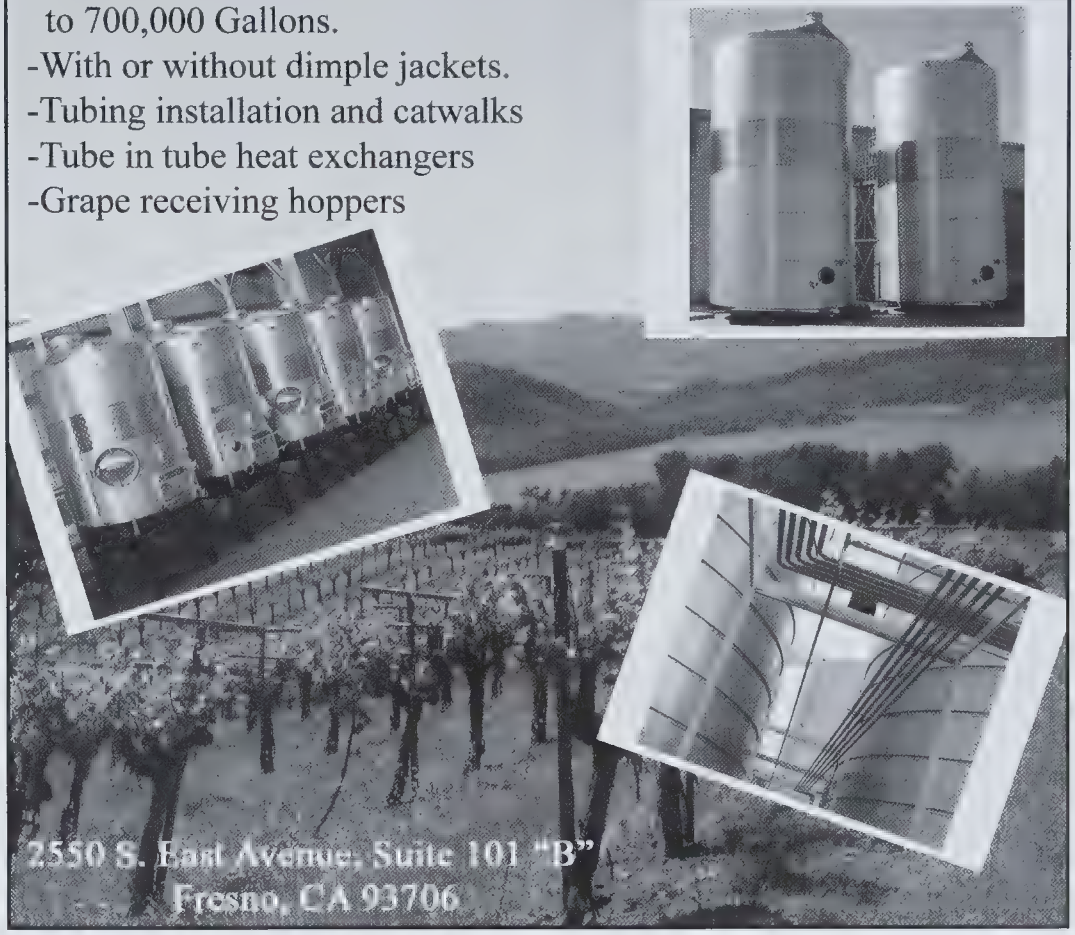

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Commercial Recycling

In addition to improving the quality of cullet received from curb-side recycling, the glass industry is also working to promote glass recycling among commercial businesses such as bars, restaurants, wineries, and hotels. O-I and other industry representatives are currently working on recycling programs in California, Colorado, Indiana, and North Carolina. These programs are often supported by local legislation.

For example, a law passed in North Carolina requiring anyone with an alcohol beverage control (ABC) permit to recycle their beverage containers resulted in an additional 40,000 tons of recycled materials. This law also spurred an increase in recycling businesses and services, and had more than an 85% compliance rate among those affected — mostly bars and restaurants.

Legislative Efforts

O-I and the glass manufacturing industry have partnered with legislators to improve container deposit laws across the country. This includes developing programs in states without deposit laws, and expanding current legislation in the 11 states with deposit laws to include more container types and provide a higher deposit reward. Of the glass attained from container deposit programs, almost 100% is reused to make new glass containers.

On a national level, the glass industry — represented by the Glass Packaging Institute (GPI) — is working with Congress on legislation to improve the amount of quality cullet available by developing incentive programs. This would include rewarding companies that use recycled content in their manufacturing, as it reduces emissions.

Take Action

What can you do to help? If you live in a bottle deposit state such as California, make sure to participate in the program, or take your wine bottles straight to a recycling facility. Your efforts will help deliver the quality of recycled glass needed to make the world a cleaner and more sustainable one in which to live. ■

Paul Smith is Manager of Global Sourcing for Cullet (recycled glass) for Owens-Illinois, Inc. He is responsible for creating and implementing a cullet strategy for O-I in North America and coordinating cullet activities in other regions to ensure consistency. Smith has more than 15 years experience in the glass recycling business. He has been responsible for the design of a specialized recycling plant, management of factories throughout the U.S. and Canada, and the development of new marketing systems by centralizing sales, sourcing, and transportation.

Article Synopsis: Many people in the U.S. wine industry do not thoroughly understand the "recycling" process of wine bottles returned to glass factory — bottles as cullet in the manufacture of new bottles. This topic is relevant on a national scope, as O-I, the world's largest glass packaging manufacturer, collaborates with receiving facilities for post-consumer glass products. The article outlines a wine bottle's journey from becoming cullet, to a glass furnace, back to the store shelves.

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Perfect Storm

Continued from page 52

engage consumers differently and to experiment with emerging social media tools more effectively. Rather than an ad hoc approach, implementation should be founded on a more compelling and authentic brand strategy, clear goals, and relevant consumer value propositions delivered consistently. ■

About the authors

Deborah Steinthal (deborah@scionadvisors.com) is the founding partner of Scion Advisors, a Napa-based wine business advisory firm that enables clients to build more financially viable businesses. She has been an executive across a variety of industries globally and helped companies transform from startup through high growth, restructure due to poor performance, and integrate new acquisitions.

Erica Valentine (erica@scionadvisors.com) is a senior associate of Scion Advisors. With over 15 years as a marketing executive at Constellation Wines and Seagram Chateau & Estates, and 10 years consulting with privately owned wineries, venture capital, and web-based businesses, Valentine advises companies on how to differentiate and compete successfully in a complex marketplace, creating and implementing marketing and sales programs that work.

John Hinman's (jhinman@beveragelaw.com) experience spans the modern history of the wine industry and includes regulatory defense before state and federal government agencies, distribution litigation throughout the U.S., arbitration and mediation of relations between grape growers and wineries, and deep involvement in the direct shipping battles from the very beginning. He is founder of Hinman & Carmichael LLP.

For further questions please call Deborah Steinthal (Scion Advisors): 707-246-6830.

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WINERIES REDUCE ENERGY WHEN UTILITIES DEMAND

PART TWO

BY Tina Vierra

Three more Demand Response incentive programs offered for winery participants include the Capacity Bidding Program, PeakChoice, and Aggregator Managed Portfolio. (See ***PWV***, November/December 2009 for Demand Response Part I, with other program information and a list of steps for wineries to reduce energy use on demand.)

All of PG&E's Demand Response plans now come with green business recognition — PG&E features DR participants in its public service ad campaigns, and provides promotional materials that wineries can share with their customers.

Capacity Bidding Program (CBP)

CBP is an especially good fit for wineries, because it allows the bidding of different curtailment amounts each month. Five days prior to the start of each month from May to the end of October, the winery indicates the load it would be able to curtail during an event. Incentives are earned based on the kW bid and actual curtailment performance if an event is called.

"Each month the winery can change the amount of kW curtailment they wish to bid in," says Maya Machnicova of Pacific Gas & Electric Company (PG&E). "This makes it possible for them to effectively plan for their crush. For example, they may bid in higher amounts during the months of May, June, July, August, then drop their bid in September and October."

PeakChoice

The PeakChoice — Best Effort option is very similar to the Demand Bidding Program (see Demand Response Part I, ***PWV***, Nov/Dec 2009). Wineries participating in this program would receive incentives based solely on whether and how they respond to an event. The winery is notified that a reduction event is approaching, and has two hours to decide if it can participate and reply to the notice.

Incentives under PeakChoice — Best Effort are as follows:

- $0.40/kWh on two-day notice;
- $0.50/kWh on one-day notice;
- $0.60/kWh on 4.5 hours notice;
- $1.00/kWh on 30-minute notice.

The less notice needed by the winery prior to a reduction event, and the more electricity use reduction the winery can achieve during the event hours, the more incentive the winery earns.

Aggregator programs

Aggregators are independent third parties authorized to work with utility customers to reduce a state's energy usage during periods of peak demand, high wholesale-electrical prices, system constraints, and emergencies. Each aggregator offers unique program options and incentives that are privately negotiated between the customer and aggregator.

PG&E authorized aggregator-managed programs include Aggregator Managed Portfolio (AMP), and the Capacity Bidding Program (CBP). Customers can also self-aggregate under the Demand Bidding Program (DBP) and the Base Interruptible Program (BIP).

CASTORO CELLARS (SAN MIGUEL, CA) AND ITS AGGREGATOR

Jeffery Bonerb is an operations manager at Energy Curtailment Specialists (ECS), an aggregator based in Buffalo, NY with offices in California, Texas, Kansas City, and other U.S. locations. ECS clients include Castoro Cellars and Constellation facilities among more than 350 California customers (5,000 facilities nationwide), commercial buildings such as the Empire State Building, and several East Coast wineries, including Glenora Wine Cellars in New York state. The ECS DR program is called "PowerPay."

ECS deals with utilities in 30 states and Canada, acting as the agent between the utilities and their commercial customers. With an understanding of programs in each utility's demand response division, ECS signs its clients for whichever program suits the facility's needs best and will earn the highest incentive possible.

In California, ECS has clients (under the ECS "PowerPay California" program) in Capacity Bidding and the Aggregator Managed Portfolio programs. A utility such as PG&E, rather than calling Castoro Cellars and other customers, calls on ECS with a demand response request, and ECS calls Castoro and other clients until the bid amount is met.

"If our portfolio is being called on to remove, say, 75 megawatts of load," Bonerb reports, "we will call Castoro Cellars asking how much load they can reduce that day. Depending on their activities when we call, Castoro has been able to meet 150 to 200kW of the energy reduction in our bid for most events. We then call other customers until we meet the full demand."

While the utility's Interval Meters are installed at the customer's location,

Renewable energy resources

Suzanne Hunt (daughter of Art and Joyce Hunt who own Hunt Country Vineyard in Branchport, NY) runs the HuntGreen LLC consulting firm (www.huntgreenllc.com), in Washington, DC, and offers recommendations for renewable energy and climate resources:

- REN 21 — Renewable Energy Policy Network for the 21st Century. "Their Global Status Report is one of the few sources of good global renewable energy data," says Hunt. (www.ren21.net/globalstatusreport/g2009.asp)
- IRENA — International Renewable Energy Agency. This agency was just created in early 2009 and 137 countries are already signatories including the U.S. (www.irena.org)
- DSIRE — Database of State Incentives for Renewables & Efficiency. (www.dsireusa.org) Click on your state and obtain all of the state and federal incentives for wind, solar, etc.
- 3 Tier — A company mapping global renewable energy (RE) resources. Wind, solar, and hydro maps are available online at www.3tiergroup.com. They are working on maps of geothermal energy resources.
- Renewable Energy World (www.renewableenergyworld.com/rea/home) "A good source of RE news and commentary."
- www.bioenergywiki.net — This site was created a few years ago to facilitate information exchange related to biofuels and bioenergy. It is used by the International Roundtable on Sustainable Biofuels to gather information and input on their draft sustainability standards for biofuels.
- www.climatelab.org — "There is good information on biochar and renewable energy, and an agriculture and climate change page is under development," says Hunt.
- www.bioweb.sungrant.org — This site was created by the Sun Grant universities with peer-reviewed biomass, biopower, biofuels, and biomaterials information and summaries of articles in layman's terms.
- Sustainable Biodiesel Alliance — (www.sustainablebiodieselalliance.com) They are developing a certification system to differentiate sustainably-produced biodiesel from unsustainably-produced biodiesel.
- 25 x 25 (www.25x25.org) Twenty-five by twenty-five stands for 25% of our energy produced renewably on farms and forest lands by the year 2025. It is an alliance of agricultural and environmental groups.
- Agriculture and Forestry in a Reduced Carbon Economy, Solutions from the Land (www.25x25.org/storage/25x25/documents/Carbon_Subcommittee/carbon_policy_discussion_guide_april_1_2009.pdf) "A great overview/explanation of different climate policies, carbon credits, carbon offsets, etc.," says Hunt.
- Global Change Impacts in the United States — www.globalchange.gov/publications/reports/scientific-assessments/us-impacts.
- RGGI — Regional Greenhouse Gas Initiative (www.rggi.org) RGGI is a carbon dioxide (CO_2) cap-and-trade emissions trading program comprised of ten New England and Mid-Atlantic states that will commence in 2009. RGGI will be the first government-mandated CO_2 emissions trading program in the U.S. Emissions cuts of 2.5% annually will begin in 2015. The states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont are signatory states to the RGGI agreement.
- NREL — National Renewable Energy Lab, part of the Department of Energy (www.nrel.gov).
- USGBC — U.S. Green Building Council (www.usgbc.org), which developed the LEED green building certification system.
- www.grants.gov. The new administration in Washington, DC created this site in 2009 to help people identify and apply for stimulus funds and other government grants.

Hunt reports these industry associations can also be a good source of policy updates:

- ACORE — American Council on Renewable Energy (www.acore.org)
- AWEA — American Wind Energy Association (www.awea.org)
- SEIA — Solar Energies Industry Association (www.seia.org)
- Canadian Wine Energy Association (www.smallwindenergy.ca.)

Hunt Country Vineyards (Branchport, NY) installed a Windspire® energy generator in 2009. The 30-foot-tall turbine is a trial to collect potential energy generation in a light wind location.

ECS has access to the meters and can monitor/report all of the client's energy data for them. ECS reports how the client met the demand during an event, and the incentives the client will be receiving.

Castoro received $40/kW credit from May to October 2009 for program participation, and participated in three events to receive event-specific incentives. ECS gives 21 hour-notice, and Castoro's energy reduction events lasted from two to six hours each time. ECS reports that the mild 2009 summer resulted in one event, which Castoro reports happened on July 27 and lasted six hours.

"We powered down refrigeration units and their circulating pumps, office air conditioning, most lights and our air compressors, and we did no bottling that day," says owner Niels Udsen.

GLENORA WINE CELLARS (DUNDEE, NY)

Established in 1977 on Seneca Lake, Glenora Wine Cellars also operates a destination inn at its lakeshore vineyard. The winery facility produces 43,000 cases/year.

Cellarmaster Tracey Miller signed Glenora up with ECS for demand response in April, 2008, for an event-specific incentive plan. The winery building is the participant for DR, not including the inn. Utility company NY State Electric & Gas has announced two demand response events since the winery joined. Winemaker Steve DiFrancesco reports that each event lasted one hour, and the winery responded by shutting down all non-essential equipment.

"Our utility demand in this climate might be less than a winery in hotter areas like California," DiFrancesco says. "Our hottest time of year is July and August, although we do have other warm periods. But our cold fall temperatures can be helpful with fermentor temperature control and juice settling. The cold winter can help (though not guarantee) cold stabilization."

Summary

As the middleman, an aggregator like ECS is able to save the utility companies the time and resources of calling on multiple customers to meet an energy reduction need, and to help the commercial client choose a program and manage its energy use for the best incentive results. The aggregator also serves as a buffer between utility and winery — if Castoro Cellars or Glenora Wine Cellars is unable to reduce demand on an event day, ECS can call

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other clients in its portfolio to meet the bid.

For wineries with good facility management, Demand Response programs can provide worthwhile incentives to offset one of the winery's largest operations costs — energy. See the resources listed below for more information about how your winery might participate.

■

Resources

For detailed information, terms, and conditions of PG&E Demand Response programs in California visit http://www.pge.com/demandresponse/.

New York State Electric & Gas Company's Demand Response program information can be found at: http://www.nyseg.com/YourBusiness/CASHBACK/cashback.html

Energy Curtailment Specialists' website is www.ecsgrid.com.

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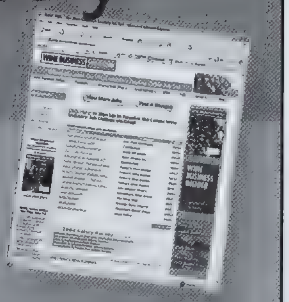

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SENSORY EVALUATION BY CONSUMERS AND EXPERTS

BY **Bibiana Guerra**

Does our knowledge of wines affect the type of wine we like? What about the wine we purchase? Are wine experts consistent? If so, what techniques do they use to consistently evaluate wines? The following research papers offer answers to these questions.

Effect of knowledge and sensory expertise on preference for red wines

[Frost, M., and A. Noble, "Preliminary study of the effect of knowledge and sensory expertise on liking for red wines." *American Journal of Enology & Viticulture*. 53 (4): 275–284, 2002]

Dr. Ann Noble and her team explain that there are many factors, besides wine flavor, that can influence our preference for a given wine: price, grape variety, winery or winemaker reputation, expert recommendations, awards, bottle appearance, and ethical considerations, among others. The authors wanted to find out whether "consumer wine knowledge" and "sensory acuity" could be added to this list.

The authors segmented their population sample (57 individuals) into six groups as follows: "low wine knowledge," "medium wine knowledge," "high wine knowledge," and similarly, "low sensory acuity," "medium sensory acuity," and "high sensory acuity."

How did they determine the segmentation? Rather than assuming which individual belonged to which group, they gave them two types of tests: a Wine Trivia Quiz — for wine knowledge classification — and a Smell Association Test — for the sensory acuity classification. For both tests, the higher the test grade, the higher the corresponding group (low, medium, or high) the individual was assigned to.

Subjects in these different population segments ranked 12 wines for preference. How did belonging to one group or another affect the type of wine a subject preferred? It did not. In general, subjects across sensory acuity groups showed similar degrees of liking — that is, they did not show any particular trends in ranking the 12 wines. Similarly, belonging to different wine knowledge groups did not explain different preferences observed.

There are two take-home messages. First, it is inappropriate to infer sensory expertise from wine knowledge, and vice versa. These are, instead, two very different types of expertise. Second, neither wine knowledge, nor sensory acuity, is a major "driver" of wine preference. The authors concluded that other individual differences — perhaps some flavor-unrelated factors mentioned at the beginning — are to blame for the type of wine we like or dislike.

Relationship between wine expertise and consumer behavior

[Johnson, T., and S. Bastian, "A preliminary study of the relationship between Australian wine consumers' wine expertise and their wine purchasing and consumption behavior." *Australian Journal of Grape and Wine Science*, 13 (3): 186–197. 2007]

The authors recruited Australian citizens and gave them three tests: an objective knowledge test, a sensory acuity test, and a subjective knowledge test ("how much **do you think** you know about wine?"). The researchers asked a series of demographic and purchasing behavior questions to gain an insight into "who purchases what, where, how much, and why."

The researchers discovered that the scores for the objective and subjective tests were highly correlated. In contrast, results for the objective knowledge test and the aroma identification test were not. This corroborates what Dr. Noble had previously found[1] — it is incorrect to infer that someone with a good general wine knowledge would also be a skilled wine taster.

The second thing the researchers discovered was that there were clear trends in the "demographic nature" of the different expertise groups. For instance, the "high-expertise" group was dominated by males, whereas young females (under 35) belonged mainly to the "low-" and "medium-expertise" groups.

The groups showed no difference in the amount of time they had been consuming wine — that is, a longer consumption experience was not the reason why some subjects were more knowledgeable. Finally, the more wine training a subject received, the higher the assigned expertise group.

The authors analyzed the purchasing behavior responses of different expertise groups to obtain a wealth of information. Regarding purchasing habits, the high-expertise individuals who consumed the most wine per week, spent the most money, and purchased the most 750 ml bottles (versus 2-liter bottles).

Regarding wine types, red wine was preferred by low- and medium-expertise males, whereas white wine was preferred by low-expertise females and high-expertise subjects of both genders. Both rosé wine and sparkling wine were consumed mainly by low-expertise females.

When asked about the reasons for buying wine (called "purchase drivers"), the item that scored the highest for all respondents was "wine style," followed by "price." "Region of origin" and "reputation of the winemaker," also ranked high, but only for the high-expertise group.

In contrast, "recommendations from friends," "awards and medals," and "advertising, promotions, and specials," ranked high only for the low-expertise group.

The authors concluded that it will be wise for the Australian wine industry to invest in wine education initiatives in an effort to boost stagnant domestic sales.

Evaluation of wine tasters

[Malík, F., S. Varga, and D. Slugen. "Evaluation of wine tasters." *Mitteilungen Klosterneuburg*, 55: 107–113. 2005]

The authors wanted to know whether the final scores assigned to wines during official wine contests (otherwise known as "cut average," or average score after the lowest and highest scores have been eliminated) are or not in agreement with individual judge scores for that same wine. They reviewed 100 wines that had been judged by 35 judges — grouped in seven panels of five tasters each — at the 2004 European Vinoforum wine contest.

Researchers used various statistical tests and found that the 35 individual wine scores for each of the 100 wines evaluated had good agreement with the official "cut average" score awarded to each wine. More judges than not (19 out of 35), tended to overestimate or underestimate the wine final score — deviations that, overall, tended to cancel out.

The authors were able to plot on a graph which judges had the best agreement with the "cut average" scores, something that provided information on individual judge performance.

The authors propose that the statistical tests they used are good tools to help select professional wine tasters, and thus improve the performance of official wine competitions.

Evaluation of consistency of expert wine tasters

[Gawell, R., and P. Godden. "Evaluation of the consistency of wine quality assessments from expert wine tasters." *Australian Journal of Grape and Wine Science*, 14 (1): 1–8. 2008]

These Australian authors believe that for wine quality scores to be trustworthy, an expert taster should first be able to demonstrate that she/he is able to reproduce a quality score when assessing the same wine several times.

Wine quality scores were collected from 571 wine experts over a 15-year period. The wine-expert demographics were as follows: 75% winemakers, 14% wine traders, 8% wine researchers, and 3% wine journalists. The wines evaluated included most varieties grown in Australia, white and red.

The wine experts could both reproduce a quality score and discriminate among red wines better than white wines. This is probably due to the tasters using color as a cue to quality. A previous study reported a relationship between both. The degree of wine score consistency was much better when using the wine scores of three tasters combined than when using just one taster.

These results proved to the authors that wine expert score consistency is generally good – particularly for reds — and that the current Australian practice of using a small panel of experts to judge a wine's "overall quality" is well-justified.

Comparison between Traditional profiling and Free profiling

[Perrin, L., R. Symoneaux, I. Maître, F. Jourjon, J. Pagès, and C. Asselin. "Comparison of traditional profiling by trained tasting panel and free profiling by wine professionals." *Amer. Jour. of Enology & Viticulture.* 58 (4): 508–517. 2007]

One of the most common sensory techniques used by both wineries and researchers is descriptive analysis — also called "conventional profiling." But these French authors observed an unavoidable truth: conventional profiling is also slow, laborious, and does

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not meet the needs of busy wine professionals.

Free-choice profiling, on the other hand, dispenses with the need for group training as it relies on attributes — a different list for each taster — that are "flash-generated" on the spot. The assumption is that, if the wines are unique enough, these various lists will have quite a few attributes in common, proving that free-choice profiling can be a valid alternative to conventional profiling.

The authors asked 17 trained panelists to evaluate 10 Loire Valley Chenin Blanc wines using conventional profiling; and asked 12 wine professionals to do the same using free-choice profiling, then compared the results.

In general, wines were described similarly with free-choice profiling and conventional profiling. Some wines were considered more "distinctive" by free-choice profiling — better differentiation — than by conventional profiling.

The best example was one wine described as "stale," "difficult to describe" by conventional profiling; and as "stale," "chemical," "pharmaceutical," and "flawed" by free-choice profiling. This discrepancy triggered a second conventional profiling — this time including the attributes "chemical aroma" and "chemical flavor," something that brought the descriptions of both panels to an agreement. Thus, free profiling was helpful to generate an excellent attribute which would otherwise not have been found.

The researchers were able to superpose the performance of individuals from each panel on a chart labeled "wine professionals" or "trained panelists." Wine professionals showed more differences among them and disagreed more in the use of certain terms, whereas trained panelists were more homogeneous — more clustered together — something the authors attribute to their training.

The authors concluded that both panels were able to reach good consensus on the main characteristics of the 10 wines studied. Conventional profiling seems better adapted in studies of treatments likely to lead to small differences. Free profiling seems to better fit a situation in which wines need to be characterized but time or availability for training is lacking.

Sensory evaluation practices in commercial wineries

[Lesschaeve, I. "Sensory evaluation of wines and commercial realities: Review of current practices and perspectives." *Amer. Jour. of Enology & Viticulture*, 58 (2): 252-257. 2007]

A key conclusion of a Sensory Symposium celebrated in 2000 as part of the 50th Anniversary of the American Society for Enology & Viticulture was that "although the wine industry values sensory data, very few wineries use sensory techniques in their winery operations."

Dr. Lesschaeve clarifies some sensory concepts often confused. First, a **wine expert** is not the same as an **expert assessor**. A wine expert "has extensive experience in a product category, and is able to perform evaluations to draw conclusions on effects of raw material, processing, storage, aging, etc."

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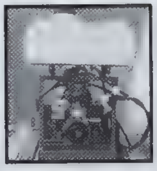

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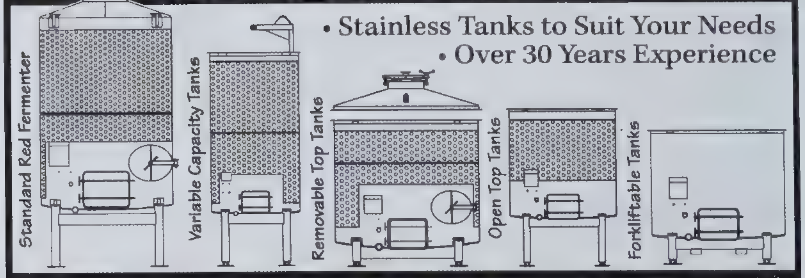

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In contrast, an expert assessor is "someone with a high degree of sensory acuity who has the ability to make consistent and repeatable sensory assessments." As in previous studies,[1,2] the superior abilities of wine experts tend to be linked to their greater wine knowledge, **not** to their superior sensory acuities.

The author gives an excellent example of what wine experts sometimes rely on: "I smell gooseberry, therefore this wine is a Sauvignon blanc, and I should also smell grapefruit and cat urine." However, there is no evidence that wine expertise can predict consumer preference and market success. In the author's opinion, this is exactly where sensory evaluation can really help.

Another pair of loosely used terms that the author notes is sensory evaluation and wine appreciation. In the author's opinion, wine educators should emphasize the difference between the two, as courses that teach the latter rarely end up teaching sound sensory practices. For that, you need a trained sensory professional.

The author emphasizes how sensory analysis is a business tool, not just a research tool. This misconception is, in the author's opinion, why wineries do not use sensory evaluation. Proof that sensory evaluation is a business tool can be found in the wide array of sensory techniques that market experts use, including:

1) **focus groups**, where consumers discuss with a moderator why they like or dislike a product;
2) **hedonic tests**, where consumers express their "degree of liking," or "rank various products," and then answer diagnostic questions (is attribute "X" "too weak," "too strong," or "just about right"?)
3) **preference mapping**, where products are analyzed for their chemical and flavor properties, in addition to their consumer "liking." Then, the objective analytical measurements are correlated with the subjective consumer scores to identify which parameters drive consumer's "likes" and "dislikes;"
4) **reverse engineering**, where empty spots in the "flavor space" – niches within a given product category where no product exists — are first identified; then a new product is designed with just those flavor characteristics that would fill the void.

The author offers some of the sensory challenges ahead, including:

1) development of a technique that would truly mimic how consumers drink (repeated sipping, drinking while eating);
2) use of "temporal dominance sensation" techniques to explore how impressions change over time;
3) development of consumer rejection thresholds, instead of expert rejection thresholds, given that consumers always reject wines at **much higher** levels of taint than experts do.

If your winery would like to start implementing a sensory program, the author provides a simple table listing the costs involved at either of two possible levels: a cost-effective level (which uses winery personnel) and an optimal level (which trains or hires an external panel).

For individual summaries to these and other articles, go to http://wineserver.ucdavis.edu and click on Trellis Alliance, then Research summaries. ■

[Bibiana Guerra, PhD, worked at Woodbridge by Robert Mondavi as a research winemaker and a grower educator for seven vintages. Before that, she worked at Flowers Vineyards & Winery (Cazadero, CA), first as an assistant winemaker (1998), then as vineyard manager (1999). She is currently senior technical writer in the Department of Viticulture & Enology at UC Davis.]

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Monitoring Microbes

Continued from page 62

Saccharomyces, but its identity is confirmed microscopically when the sexual stage of conjugation begins in culture in one to three weeks.

When preparing to conjugate, cells grow a projection called a "shmoo tip," distinguished from a bud by the lack of a membrane between the cell and the projection. Conjugating cells join their cytoplasm and exchange genetic material, making odd shapes often resembling dumbbells or more bizarre structures.

Most *Zygosaccharomyces* strains grow on acetic acid agar while *Saccharomyces* do not. PCR-based genetic techniques can identify *Zygosaccharomyces* cultures before conjugation is observed. However, in some identification systems (such as API), certain *Candida* yeasts cross-react with *Zygosaccharomyces*, so all methods, including PCR primers, should be rigorously checked against a large number of wine-related *Candida* species to ensure specificity. Cultures identified as *Zygosaccharomyces* by any technique including PCR should be kept until conjugation is observed to confirm their identity.

MICROBES IN THE BOTTLE

Microbes to watch out for: *Dekkera/Brettanomyces*, lactic acid bacteria; if residual sugar is present, *Saccharomyces* and *Zygosaccharomyces*

Danger signals: Change in color, aroma, or flavor, CO_2 production, clouding

Monitoring methods: Sensory evaluation, microscopic exam, culturing, PCR-based genetic techniques.

To assess microbial stability before bottling, there are four main questions to ask:

1. Does the wine have residual fermentable sugar (over 0.5 g/L glucose + fructose)?
2. Does the wine have residual malic acid if in pH range for MLF (this pH will vary)?
3. Does the wine have *Pediococcus*?
4. Does the wine have *Brettanomyces*?

If the answer to ALL four questions is no, the wine is likely to be microbially stable even if not sterile-filtered to remove all microbes. Surface film yeasts can grow in the bottle for only a few days, until dissolved oxygen is depleted, and *Acetobacter* cannot grow unless the closure is compromised.

1. Residual fermentable sugar trumps everything else.

Most wine microbes will use residual fermentable sugar if it is present. Fructose can be an exception; *Saccharomyces* is reluctant to use fructose if the glucose/fructose ratio is less than 1:6 to 1:10. Although it is risky to count on it, and other yeasts and bacteria (including *Zygosaccharomyces*) can use fructose, *Saccharomyces* refermentation is less likely in stuck wines that have been depleted of glucose.

Traditionally, the lowest levels of concern for *Saccharomyces* are 5 to 10 cells per BOTTLE (not per ml). Wines with only 6 cells per bottle have fermented, but other wines escaped problems with 15 cells per bottle. These are very low numbers, however, and methods that do not detect as few as 3 cells per bottle are not sensitive enough.

Filtering 250 ml of wine for yeast and 100 ml for bacteria, and culturing the membranes, is the preferred method for checking bottle sterility. Genetic tests that require 10 cells/ml for detection are not suitable even if an entire bottle is filtered to concentrate the cells.

PCR tests can help monitor bottled wines for microbes that are at high enough levels, and viable but non-culturable (VBNC) microbes or as David Mills (UC Davis) calls them, "non immediately culturable cells." Current plating methods do not detect microbial cells in this state.

Levels of *Zygosaccharomyces* for in-bottle fermentation are not known, but because of the aggressive and tenacious nature of this yeast, even one cell is considered a serious problem in a wine with residual sugar. *Zygosaccharomyces* can take up residence in a bottling line for months or even years, surviving normal sanitizing procedures (even hot water), and infecting wines sporadically.

Certain lactobacilli can cause problems in the bottle by metabolizing residual sugar and producing acetic acid (but no ethyl acetate so there is no smell).

2. Leftover malic acid

Any of the lactic acid bacteria can cause trouble in the bottle if they metabolize residual malic acid. Cloudiness, a fine sediment, CO_2, and a rise in pH (which can lead to protein or tartrate instability) are all possible consequences.

How much malic acid is too much depends on the wine; haziness is more noticeable in whites than in reds. In reds, a drop of around 0.5 g/L malic acid causes a slight spritz and, if the wine is light in color, a perceptible

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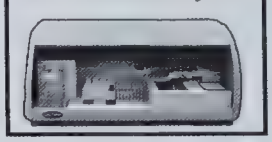

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haze. Most wines at pH 3.4 or higher with residual malic acid should be filtered with a 0.45 μ membrane.

3. ***Pediococcus***

Some members of this genus (*Pediococcus pentosaceous*) can grow in wine without residual sugar or malic acid. Sometimes their growth causes a cosmetic problem only (haziness and fine sediment), but sometimes biogenic amines may be produced, or an unpleasant aftertaste (not mousiness) may develop. Reds, especially Pinot Noir, blended shortly before bottling and not sterile-filtered are most at risk.

4. ***Brettanomyces/Dekkera***

Test for *Brettanomyces* on a regular basis before preparing wine for bottling, to determine whether the population is increasing or declining, unless the wine will be filtered with a 0.65 μ or 0.45 μ membrane. If they grow in the bottle, *Brettanomyces* produce a small amount of CO_2, which may not be noticed unless the wine is examined carefully. Sensory changes in the bottle can be profound, from 4-EP, 4-EG, and other metabolites.

Bottle variation is common, with some bottles showing little Brett character but other bottles severely affected, their fruity aromas replaced by horse-sweat and Bandaid® odors, accompanied by a bitter, metallic finish. Interestingly, these characters can seem to intensify in the bottle even though the actual levels have not changed.

Non-wine microbes in the bottle

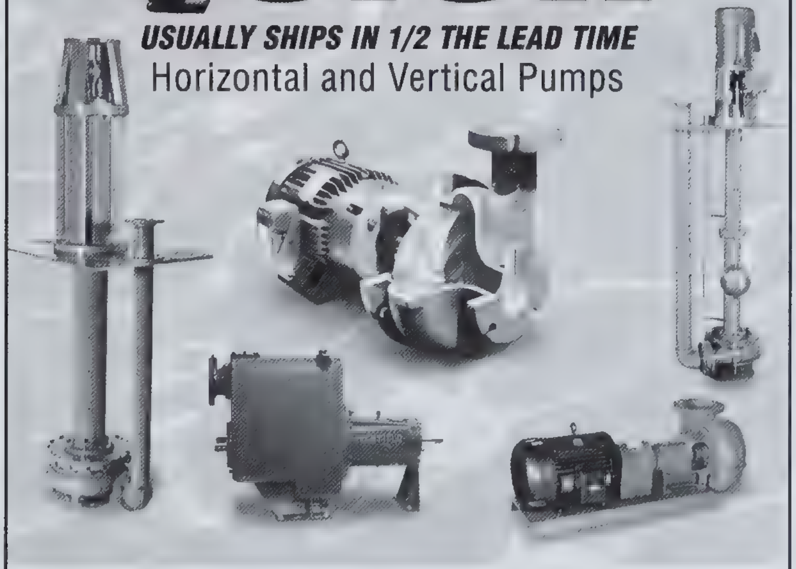
Microbes that are unable to grow in wine may survive the inhospitable environment for a few days to weeks (or sometimes, months). They make culturing difficult until they die, for they may cover or inhibit wine microbe colonies in culture. Molds and spore-forming bacteria are common bottling contaminants, as are non-wine cocci and some yeasts.

These microbes are important because their presence can indicate problems with bottling sanitation, which can be serious. If more than a few non-wine microbes grow on membrane filtration cultures after bottling, a complete evaluation of bottling line sanitation is recommended to find the source(s) of infection. ■

References Available on Request

A printing error in the September/October 2009 issue led to the omission of the final two lines of text on page 47, Monitoring microbes during fermentation, *by Lisa Van de Water.* ***PWV*** *offers the missing text here, with apologies for the inconvenience to our readers.*

In cellars heavily affected with Brettanomyces, culturing once a week or testing with PCR during MLF is recommended. ■



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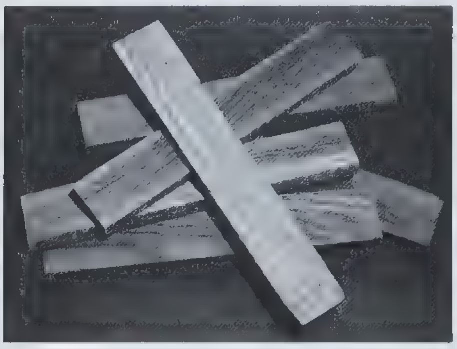

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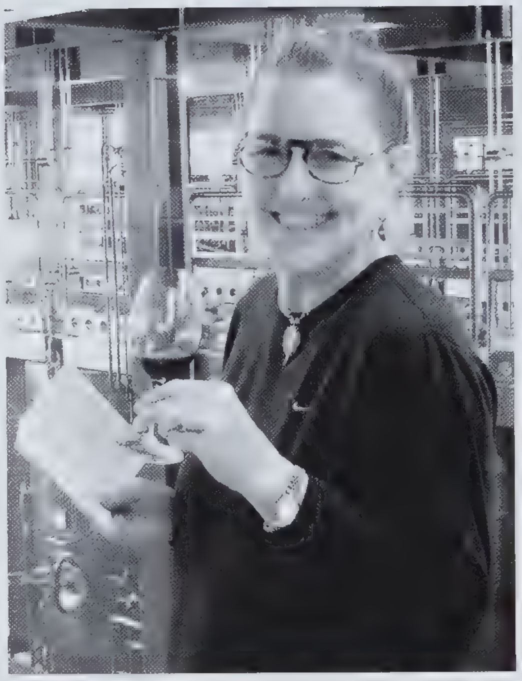
Lessons from global winemaking

Zelma Long gave the 2009 Merit Award presentation to the Annual Meeting of the American Society of Enology & Viticulture in June in Napa, CA. She shared many winemaking examples from her consulting in the last ten years in California and Washington state. Long, a graduate of UC Davis, worked in several California wineries, and has made wine in South Africa and Germany.

Highlights of the text are below and readers are urged to access the full text at www.asev.org or purchase an audio recording of Long's presentation and other 2009 annual meeting events in mp3 format.

Long would like to convince every young winemaker to seek an overseas experience. "It will be invaluable to you and make you a more seasoned, wiser contributor to our U.S. wine business." Five lessons were presented that stand out for her and summarize her experiences. The lessons may not necessarily be new to you, but her time overseas has made them more profound for her.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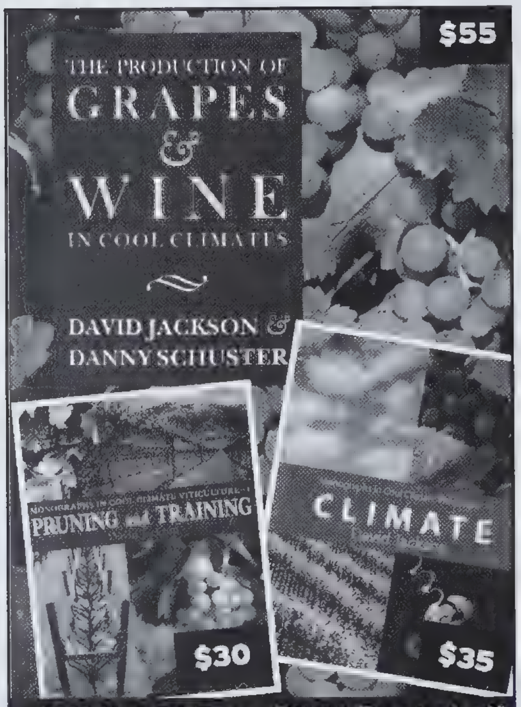
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***Lesson 1:* Great, fine, and delicious wines are made in every country.** In the last two decades, we have seen a powerful emergence of Australia, New Zealand, Chile, Argentina, and South Africa in the European market. Spain has re-emerged and is bursting with old vines and fine wines. Producing and delivering excellent quality for each price point is the foundation of being competitive. Beyond that, of course, we need to make wines of personality and distinction.

***Lesson 2:* Terroir (vine microclimate) is a powerful force.** She illustrated this lesson with terroir stories from her experience in Germany, South Africa, eastern Washington state, and Priorat, Spain.

Long summarized terroir as "ground truth." The differences in chemistry, color, tannins, aromas, flavors, elements we have not yet measured, that result from differing vine environments. She urged sensitivity to the differences in vine microclimate, because she believes that great winemakers observe these differences in their own site and respond to them in their winemaking.

***Lesson 3:* Culture has a potent impact on winemaking.** It is often said that the concept of terroir includes those who grow the wines. "We know this to be true; we know how impactful our wine and vine decisions are on the wines we produce. Because of the human impact, to make wine successfully elsewhere one must be sensitive to the cultural environment."

Winemaking history is deep in many countries, and Long discussed France as an example. Winemaking practices and winegrowing regulations are unique to regions, including Israel, Germany, and France. Examples of how the political culture in countries such as South Africa, Australia, Germany impacts winemaking were given.

Business cultures are different in other countries.

Six valuable cultural suggestions were presented for anyone working overseas.

***Lesson 4:* There is much to be learned "out there."** Benchmarks, new ideas, historical perspectives, and current research exist in every wine territory.

***Lesson 5:* Financing, and financial success, bring results.** Business financial success has made startling changes in Bordeaux and Napa Valley. Research funding from government agencies is powerful. New investment can revitalize old areas such as South Africa, and Priorat, Spain.

Quality — of grapes and wine — is the foundation for success, and investments must be made to sustain, ensure, and further develop that quality.

Long's conclusion: To the students of winegrowing and winemaking, work overseas before committing yourself to a position — learn, have fun, make the global wine and vine friends who will become your professional network — and you will have more to contribute to your own success and to that of our winegrape and wine business. ■

Zelma Long and her husband, Phillip Freese make Bordeaux varietal red wine from the Vilafonte Wine Estate in South Africa. Long is a partner in Long Vineyards, Napa Valley, and owns Zelma Long Wine Consulting Practice.

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Tasting Room FALLACIES

BY Craig Root

During these difficult economic times, I find it painful to report that many tasting rooms are using practices that are ultimately harmful to their profits. For example, I recently heard about a tasting room capping its club growth at under 500 members. Why? Because their event tent would only accommodate a certain amount of people for their annual party.

To limit your profits rather than getting a bigger tent or an additional tent, or dividing the party into two days, just does not make sense. Here are some common tasting room fallacies with appropriate counter-arguments.

Fallacy #1 — *I can get by with a minimum amount of staff because I will save on labor costs.*

You may save $60 to $100 by not having an extra person on staff. However, when a wave of customers comes in — as it often does — you can't harvest that wave.

Calculate the lifetime value of your wine club members (cost per shipment multiplied by a 1- to 1.5-year membership), which is usually $300 to $500. All that extra staff person has to do is sell **one** wine club membership every other day to justify their employment. Plus, having that person always guarantees superior service — which pays off in sales, repeat business, and positive word of mouth.

Hess Collection Winery (Napa,CA) has wooden flooring which is more comfortable for tasting room staff and customers.

I have been working in tasting rooms for 30 years (14 as staff and manager; 16 as a consultant). If I had to emphasize one trait of successful tasting rooms, it is proper staffing. By the way, not everyone has to come in at 9 AM or 10 AM. Use staggered shifts so the extra person comes in at noon or 1 PM.

Fallacy #2 — *I don't need to worry about acoustics in my visitor center.*

Have you ever been out to dinner where the restaurant is so noisy you have to shout to be heard? Do you want to go back? Of course not. Loud tasting rooms are also a real turnoff.

If you have this problem, hang tapestries on the wall or decoratively from the ceiling. Or use carpets, which are stain-resistant and firmly attached to the floor. Many beverage-heavy industries, such as casinos, use carpets. The resources are out there. Another solution is to utilize new acoustic tiles, which look very classy.

Fallacy #3 — *You do not need to worry about the flooring in your tasting room.*

Simply put, "tired feet do not sell well." People, young or old, who have ever worked on tile, marble, concrete, brick, or other hard flooring can tell you that continuous walking on these surfaces diminishes their energy. My hunch is that tired feet costs you 3% to 5% per year in sales. That may not sound like much, but in a million dollar business, that is a loss of $30,000 to $50,000 per year.

When a customer comes up to you with 10 bottles of wine to purchase, and it is 4 PM, and your feet are hurting, you do not say: "With two more bottles, you could get 10% off." Or: "That is a large purchase; if you join our wine club, you could save $40 with a club discount." Instead, you just ring up the purchase as is because you are in pain.

I know that people use mats behind the counter on hard surfaces, but keep in mind that the staff is **not** always behind the counter. In addition, I frequently see mats which are inadequate, threadbare, and/or do not cover the entire area behind the counter.

Another important factor is customer comfort. I do a lot of mystery shopping for clients, and I can report that after standing at a counter for 1/2 hour on tile, my feet begin to hurt.

One last reason I am against hard floor surfaces is that they tend to create acoustic problems because they reflect sound to a greater degree.

If you or a visitor drop a bottle or another delicate item onto a wood floor, there is a chance that it may not break. If you drop a bottle on tile, it invariably breaks.

When I help design a tasting room, I recommend wood flooring and excellent mats behind the counter. I am aware that wood needs to be resurfaced every five years or so compared to tile or concrete. However, those costs are more than covered by the additional sales which accumulate when your staff is feeling no pain in their feet, ankles, and lower backs.

I have heard complaints about working on hard surfaces from every age spectrum, not just retired employees. As the old saying goes, "When your feet hurt, you hurt all over."

Fallacy #4 — *My tasting room manager can not only run the room but also manage a six-shipment-per-year club of over 500 members.*

Is it physically possible? Perhaps, but at what cost in terms of a truly profitable club? I usually ask clients to make the club manager a full-time position at 500 or more members, particularly if you dispatch four or six shipments per year.

Fallacy #5 — *When people want to drop out of my wine club, there is nothing I can do about it.*

This is exactly why you need a good club manager. When members call to say they are quitting because of the economy, the smart club manager responds: "Did you know that we have another club — which we do not tell people about — that only ships once or twice each year?" Of course, many members won't go for that deal, but some may — which means more revenue for you.

It obviously takes more work to run a subset club, but that is just one of the ways full-time club managers pay for themselves.

Fallacy #6 — *I do not have to add variety to my club events; I can do the same exact events each year and members will not notice.*

In this age of 200 television channels and the vast array of entertainment available, Americans are more jaded than ever. They may not complain because of repetitious events, but they surely notice.

One way to add variety is to do seminar-type events. How about a wine and cheese pairing seminar with wine tasting and lunch? Or you could offer a grilling seminar with wine tasting and dinner. How about enhancing your events with live music or vignettes from a local theater company? The harsh economy has hit these folks as well and many musicians and theater people may be willing to trade their services for wine.

Fallacy #7 — *Our wine club should do fewer shipments with more bottles per shipment because it is easier for staff and management.*

The problem with this approach is twofold: one, when you put more than two bottles in a standard shipment, you run the risk of sticker shock when customers ask what is the average cost per shipment.

Problem two, in essence, is that the club members are paying you to be reminded about you. It makes sense to remind them six times each year instead of four, for example. Some people worry that six times per year is too often. However, when you really think about it, that is 60 days between shipments — which is certainly a long time — particularly in the hectic lives of most Americans.

Fallacy #8 — *If I prepare my wine club shipments in-house, the only thing I need to charge the club member for is the shipping cost.*

How long do you think the Craig Root shipping company would last if it did not charge for labor and packaging materials? This is a common error I see with many of my clients. On a 1,000-member club, this represents a significant amount of money.

Calculate your labor and packaging material costs, and then add an appropriate surcharge to the customer shipping fee. After all, Americans are used to this practice since every TV commercial selling a product that has to be shipped states the price *plus* shipping and handling.

Fallacy #9 — *I don't want to or need to do tours.*

Tours are, in effect, your infomercial. If visitors are willing to give you their precious weekend or vacation time to listen to your story, why turn them down? Other businesses would love to get the consumer's undivided attention.

You may have to plant a couple of vines in half-barrels outside your tasting room doors or have a barrel somewhere in your building for barrel tasting. If you are worried about safety as you lead the group through your winery, train your staff to be extremely safety-conscious, and paint lines on the floor to keep tours away from certain working areas.

Remember: people who go on tours buy more and join wine clubs at a higher rate.

Conclusion

During recessions you can hunker down and endure the pain, or you can become ingenious and insightful about your tasting room practices in order to stay profitable. ■

With 30 years of experience in winery tasting rooms, Craig Root teaches Tasting Room Design and Management at UC Davis and spends the first Saturday of every month working in a busy winery tasting room, averaging one wine club sign-up and two tours per shift. Website: www.craigroot.com.

February 20–21
Fifth Annual
Alsace Varieties Festival
Mendocino County Fairgrounds, Boonville, CA

Anderson Valley Winegrowers Association (AVWA) will present the only U.S. event to focus on the mostly dry, white wines from Alsace, France. The festival, capitalizing on the increasing popularity of varieties such as Riesling and Pinot Gris, includes a technical conference, a grand tasting, a winemakers dinner, and winery open houses. Producers from around the world will pour Riesling, Gewurztraminer, Pinot Gris, Pinot Blanc, and Muscat during the two-day celebration.

Technical Conference: Saturday, 8 to 11AM. Cost: $45 per person. Highlights pertinent issues in winemaking and grape growing, with an in-depth wine tasting of one of the focus varieties. Breakfast included.

Alsace Varieties Grand Tasting [Saturday — 12:30 to 3:30PM.] will showcase aromatic white wines from producers in California, Oregon, Washington, Michigan, New Zealand, Alsace, and several other states and countries. Entertainment will be provided and food made by local purveyors will illustrate the versatility of pairing Alsace-variety wines to a wide array of cuisines. Meet the winemakers and taste Alsace-style white wines from around the world, including Riesling, Gewurztraminer, Pinot Gris, Pinot Blanc and Muscat! The event will brighten even the darkest winter month! Cost: $65 per person.

The winemakers dinner at the Boonville Hotel on Saturday will focus on Alsace-style wines and Pinot Noir produced by participating wineries. The gourmet, sit-down meal will be prepared by Chef/Owner Johnny Schmitt. Cost: $125 per person.

Additional information can be found at the Anderson Valley Winegrowers Association Web site at www.avwines.com, or contact the Association via e-mail at info@avwines.com, or tel: 707/895-WINE.

March 18, 2009
Recent Advances in Viticulture and Enology (RAVE)

Learn how to increase the sustainability of winery and vineyard operations. The concept of sustainability has been broadened to include many practices, some of which are not sustainable. RAVE 2010 will focus on sustainability as defined by a minimal environmental impact or footprint. Discussions will include practices that sustain viticulture environments (air, water, and soil) for future generations and are capable of producing high quality winegrapes, table grapes and raisin grapes, and wines.

Six broad topics include: Maintaining Healthy Soils, Maintaining Healthy Watersheds, Best Practices in Insect Management, Best Practices in Water Use and Management, Integration of Management Strategies.

Speakers include: Kendra Baumgartner, USDA-ARS, Davis, CA; Linda Bisson, Dept. of Viticulture & Enology (VEN), UC Davis; David Block, Dept. of VEN, UC-D; Roger Boulton, Dept. of VEN, UC-D; Monica Cooper, University of California Cooperative Extension, Napa County; Kent M. Daane, Dept. of Environmental Science, Policy & Management, UC Berkeley; Andrew McElrone, USDA-ARS, Dept. of VEN, UC-D; Anthony O'Geen, Dept. of Land, Air & Water Resources, UC-D; David Smart, Dept. of VEN, UC-D; Kerri Steenwerth, Dept. of VEN, UC-D; Thomas Tomich, Dept. of Environmental Science & Policy, UC-D; Joshua Viers, Dept. of Environmental Science & Policy, UC-D; Andrew Waterhouse, Dept. of VEN, UC-D; Larry Williams, Dept. of VEN, UC-D; James Wolpert, Dept. of VEN, UC-D; Andrew Walker, Dept. of VEN, UC-D.

TIME: 8:30AM–4:45PM. **COST**: $220. **LOCATION**: Freeborn Hall, UC Davis. For more information: visit www.extension.ucdavis.edu/wine.

April 13–15
License to Steal
Wine Marketing Conference
Lodge & Conference Center, Geneva, OH [East of Cleveland]

The state wine marketing offices of Illinois, Indiana, Michigan, Missouri, New York, Ohio, and Pennsylvania announce the fifth annual marketing-only conference for winery, media, tourism professionals, and economic development offices in wine regions.

"Content Marketing" will be presented by Joe Pulizzi (author of a book by the same name). There will be a media panel consisting of bloggers and free lance writers, a wine press panel, two sessions on social networking [an introduction and advanced session]. The "Steal Sessions," where attendees share their most successful and creative projects from the prior year will be another highlight. A trade show will focus on vendors that serve wine marketers and tasting room managers.

For more information, go to www.NationalWineMarketing.com. As the entire program is designed as a not-for-profit learning event, registration is only $250 per person (including meals). The host hotel, the Lodge at Geneva, www.TheLodgeatGeneva.com offers an $85 room rate.

April 29–May 1
Hospice du Rhône®
Paso Robles Event Center, Paso Robles, CA

Hospice du Rhône® (HdR), the world's largest celebration of Rhône variety wines will celebrate 18 years of all things Rhône. The international gathering draws Rhône producers and enthusiasts from all corners of the globe to pay homage to the diversity of the distinct 22 Rhône grape varieties.

Festivities begin Thursday with the highly-spirited Rhone 'n Bowl. Friday includes two Rhône focused seminars, a Rosé-inspired lunch, the enhanced Rhône Rendezvous, and a new "The Sommelier Soirée." Saturday includes two Rhône- focused seminars, the annual HdR Lunch and Live Auction, the Grand Tasting, and a Farewell BBQ.

Rhône inspired cuisine for the lunches and evening affairs will be prepared by Chef John Toulze of the girl & the fig (Sonoma, CA).

The Friday Rhône Rendezvous will test the noses of attendees with a sensory exploration and tantalize taste buds with a food pairing.

Two of the four seminars will include Stéphane Ogier of Domaine Michel and Stéphane Ogier of Ampuis, France headlining one seminar, and six Rhône producers from South Africa will lead the other. The South African producers are: Boekenhoutskloof, De Trafford, Mullineux Family Wines, Sadie Family, Stellenzicht, and Tulbagh Mountain Vineyards.

Tickets for the 18th annual gathering will be available for purchase on the Hospice du Rhône website (www.hospicedurhone.org). Event ticket prices range from $100 to $795 depending on event selection.

May 6, 2010
Variety Focus 2010 — Sauvignon Blanc
Freeborn Hall, UC Davis

The seventh in a series of courses to focus on the viticultural side of select wine grape varieties. This aromatic variety from the Bordeaux and Loire Valley regions of France produces some of the world's most distinctive dry white wines and is an ingredient in the great sweet white wines of Sauternes. Lectures will include information on the origin of Sauvignon blanc; its history in France and the New World; the importance, development, and selection of clones; and the role of Sauvignon Blanc in the wines of France and regional wines from other areas, particularly California. The lectures will be provided by Phil Freese (viticultural consultant and winemaker in Sonoma County, California and South Africa); Deborah Golino (Director of Foundation Plant Services, UC Davis); Glenn McGourty (UC Cooperative Extension Director for Mendocino/Lake counties); John Buechsenstein (winemaker in Napa and other regions of the California coast and wine educator for 30 years); Jean-Michel Boursiquot (French ampellographer and expert on the French clones and history of Sauvignon Blanc); and a New Zealand expert on Sauvignon Blanc clones.

For more information: visit www.extension.ucdavis.edu/wine.

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Thinking of planting NORTON in 2010?
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Davis Viticultural Research
Announces the limited release of
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Two remarkable new patented grape vines – each is CABERNET SAUVIGNON crossed with NORTON.

Combining the finer features of both vines!

Visit: Davisvines.com for further information

7TH INTERNATIONAL SYMPOSIUM –
Cool Climate Viticulture & Enology

WASHINGTON STATE CONVENTION & TRADE CENTER
SEATTLE, WA, JUNE 20-22, 2010

PREVIEW of AGENDA and Keynote Speakers

SUNDAY, 20 JUNE

5 PM – Welcome Wine Reception

MONDAY, 21 JUNE

8:10 AM– Climate Change – Challenge and Opportunity to Adapt or Suffer the Consequences

10:30 – VITICULTURE: Water Management – Quantity and Quality
"A Hydraulic World: from Plant Water Transport to Vineyard Irrigation Requirements," Claudio Lovisolo [University of Turin, Grugliasco, Italy]

10:30 – ENOLOGY: Acidity Management – Up or Down?
"Understanding and Adjusting Acidity Measures in Cool Climate Juices and Wines," Roger Boulton, [UC Davis]

Noon – Lunch/Poster Session

1:30 PM – VITICULTURE: Grape Ripening – Dealing with Variation
"Causes and Consequences of Variation in Fruit Composition," Serge Delrot [University of Bordeaux, France]

1:30 PM – VITICULTURE: Innovation – From Mechanization to Automation
"It is a Robotic World: A Primer" [Jim McFerson, WA Treefruit Research Comm.]

3:30 – VITICULTURE: Soil Management – Integrating Nutrition, Biodiversity, Carbon Sequestration, Salinity, and more
"Patience Please – Amending Vineyard Soils," René Morlat, [INRA, Beaucouzé, France]

3:30 – ENOLOGY: Microbiology – Good, Bad, or Ugly
"Control of Alcoholic Fermentation during Winemaking: Current Situation and Prospects," Jean-Marie Sablayrolles, [INRA, Montpellier, France]

TUESDAY, 22 JUNE

8 AM – Fruit and Wine Aroma – Focusing on Objectivity
"Which Volatiles Really Contribute to Wine Aroma?" Denis Dubourdieu [University of Bordeaux, France]

10:30 – VITICULTURE: Disease Management – Sustainability and Innovation
"Linking Plant Resistance and Disease Forecasting Models," Olivier Viret [Swiss Federal Research Station Agroscope, Switzerland]

10:30 AM – ENOLOGY: Health Benefits and Consumer Interests
"Grapes and Human Health," John Pezzuto [University of Hawaii]

Noon – Lunch and Poster Session

1:30 PM – VITICULTURE: Canopy Management – Beyond Fruit Exposure
"Back to the Future for Grapevine Canopies," Andrew Reynolds [Brock University, Canada]

1:30 – ENOLOGY: Oxidation and Phenolics "Recent Revelations in Oxidation," Andy Waterhouse [UC Davis]

3:30 – Sensory Evaluation – From Grape to Glass
"Wine Sensibilities – a Journey through Key Attributes Consumers Look for," Isabelle Lesschaeve [Vineland Research and Innovation Centre, Canada]

5 PM – Closing Remarks, Announcing 2013 Host
5:15 PM – Poster Session and Wine Reception
7 PM – Symposium Dinner

FOR MORE INFORMATION, VISIT: WWW.ASEV.ORG.

Organized by American Society for Enology & Viticulture Northwest Chapter

PW PRACTICAL WINERY & VINEYAR

WINERY EQUIPMENT SHOWCASE

JANUARY/FEBRUARY 2010

Aaquatools 91
Acrolon Technologies 89
American Tartaric Products ... 89
ARS Enterprises 95
ColloPack Solutions 97
CUNO Filter Systems 99
Electro-Steam Generator 98
Euro-Machines 93
Fogmaster 90
Gusmer Enterprises 90
ITT Jabsco 92
GW Kent 95
KLR Machines 92
Koch Membrane Systems 97
Logix 91
Napa Fermentation Supplies 96
Ogletree's 95
P&L Specialties 96
Pro Refrigeration 94
Pulsair Systems 100
Raynox 2000 98
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Smart Fog 94
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TCW Equipment 89
Unitech Scientific 98
Vino Vessel 91
Westec Tank & Equipment 9
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AMERICAN TARTARIC PRODUCTS, INC.

For years, winemakers have added oxygen to wine — it has only been in the last decade that specific tools for this task became available. Parsec has revolutionized micro-oxygenation technology by offering the only system that supplies oxygen by weight instead of volume.

When releasing a potentially dangerous gas like oxygen in a wine tank, you have to be absolutely sure that the quantity you release is precise, in order to be able to repeat it. There is a wide range of equipment that measures oxygen dose by volume (ml). A liter of gas can be a very small quantity (at low pressure and high temperature) or very large quantity (at high pressure and low temperature). To measure gas by liter, a winemaker must refer to a specific pressure and a specific temperature.

Usually, micro-oxygenation equipment is fed by a gas cylinder, and the pressure-reduction gears are not able to provide a precise pressure value. Parsec systems have taken this into account by measuring the weight of the oxygen molecule, temperature, and pressure to the micro-second with no calibrating, assuring the most accurate system available today. Systems are available from one to 120 units and are PC-compatible.

For more information, contact:
American Tartaric Products, Inc.
1230 Shiloh Rd., Windsor, CA 95492
tel: 707/836-6840; fax: 707/836-6843
e-mail: bill@americantartaric.com
website: www.americantartaric.com

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ACROLON TECHNOLOGIES, INC.

Acrolon, an industry leader in tank temperature control, offers a range of affordable controls and software for any size winery.

TankNET® Plus is a comprehensive fermentation management system capable of expanding beyond tank temperature control to include continuous brix monitoring, automatic pumpovers, energy-efficient chiller operation, and seamless integration with production software packages (WMDB, BLEND, VINx2 and others). Multi-user access to animated cellar maps, real-time fermentation graphs, tank control panels, alarm settings, and more is provided via web-browser.

TankNET® Lite is designed for small to mid-size wineries, with an economical Web appliance, TankNET Lite for remote monitoring and control of TankNET thermostats, viewing fermentation graphs, and receiving alarm notifications via email or cell phone. TankNET Lite also signals when one or more tanks is calling for cooling.

TC-1 Fermentation Controller: Offers calibration-free temperature control plus Brix and pump-over tracking and optional I/O modules for automated pumpovers, continuous Brix measurement (via densitometer) and barrel room humidity, CO_2 and night air cooling.

PL-1 Wire-Less Thermostat TankNET PL-1 is a water-proof tank thermostat that provides calibration-free temperature control, manual brix and pumpover entry and wireless networking to TankNET and TankNET Lite Web software.

For more information, contact:
Acrolon Technologies, Inc.
19201 Sonoma Hwy., Sonoma, CA 95476
tel: 707/938-1300; fax: 707/938-1342
e-mail: info@acrolon.com
website: www.acrolon.com

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TCW/THE COMPLEAT WINEMAKER

TCW's Rotho peristaltic pump is one of the gentlest pumps used for transferring wine and pumping must. Over the past 60 years, the Rotho peristaltic pump has been a leader in the industry for its quality and performance. The peristaltic does not damage grapes, skins, or seeds during pumping, and can be operated dry without damage. During fermentation, winemakers have a total control of oxygen exposure by minimizing or adding if desired.

During harvest, a removable stainless steel must and pomace hopper with augers and independent drive motors can be added to the peristaltic and operate between 8 and 65 TPH. The rollers are on bearings, eliminating the requirement for adding lubrication fluid inside the pump housing.

Ragazzini pumps offer many of the positive advantages of progressing cavity, lubricated shoe tube, and rotary lobe pumps but without the moving parts, inner friction, shear, and potential contamination and damage of those pumps. The only part of the roller-type peristaltic pump that contacts the pumped material is the multiply food grade tube.

TCW has been putting together and repairing pumps for winery and food applications for more than 40 years.

For more information, contact:
TCW/The Compleat Winemaker
955 Vintage Ave., St. Helena, CA 94574
tel: 707/963-9681; fax: 707/963-7739
e-mail: mnicholson@tcw-web.com
website: www.tcw-web.com

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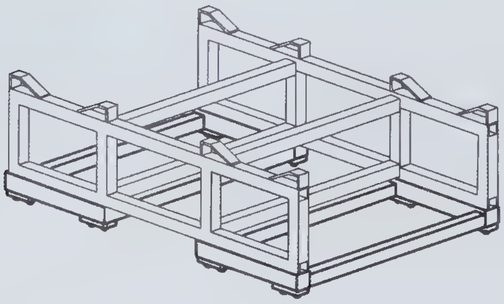
WESTERN SQUARE INDUSTRIES

Western Square began production and sale of the successful Seismic Support System for wine barrel safety in 2009. This modified barrel stacking rack assembly attaches to the bottom rack of a barrel rack column and using ball bearings, allows racks to slide rather than sway (and topple) during an earthquake.



In the testing stages on Cal Poly State University's shake table with Charles Chadwell and his team, the only visible movement was a forward and backward sliding. This one piece of equipment can potentially save wineries millions of dollars in damage and loss when an earthquake occurs.

Western Square is in the development stages of several new products which should hit the market in 2010.

"We pride ourselves in our ability to locate the industry's needs and put our people together to find solutions. It's always with an eye to cost-effectiveness and minimal environmental impact," says president Trygve Mikkelsen.

For more information, contact:
Western Square Industries
Trygve Mikkelsen
1621 N. Broadway, Stockton, CA 95205
tel: 209/944-0921; toll-free: 800/367-8383
website: westernsquare.com

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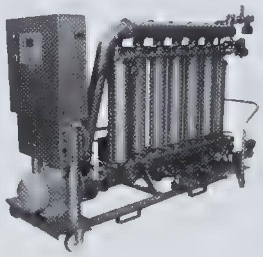
GUSMER ENTERPRISES

Gusmer Enterprises represents Bucher Vaslin cross-flow filters to the U.S. wine industry. There is an appropriate size Bucher Vaslin cross-flow filter for every winery and budget. Bucher's FX1, FX2, and FX3 filters for small wineries offer flow rates of 150 to 1,000 gallons/hour. For mid-size wineries, the FX5 and FX6 models range from 745 to 2,000 gallons/hour. For large winery use, the FX100 and FX400 Bucher filters handle flow rates of 1,500 to 15,000 gallons/hour.



The Bucher Vaslin cross-flow design utilizes a low filtration differential pressure (maximum 1.2 bar) and operates with essentially no increase in wine temperature. An automatic backflush system maintains an optimum flow rate. This system eliminates the handling concerns and need for disposal of loose filtration media. The units are fully automated and can operate around the clock without direct operator supervision.

Evaluate a Bucher Vaslin filter at your facility with a demonstration unit. Full-time cross-flow technical staff is available for demonstrations, training, and service calls. Contact a Gusmer Enterprises representative for more details.

Gusmer Enterprises, Inc.

For more information contact:
Gusmer Enterprises
Kathy Bollack, Dave Gusmer, Bill Merz,
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81 M Street, Fresno CA 93721
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website: www.gusmerenterprises.com

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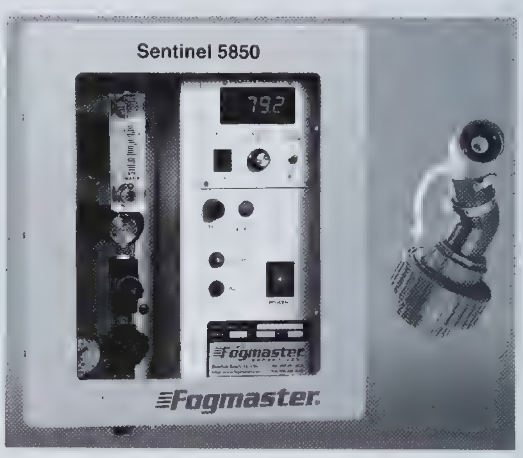
FOGMASTER CORPORATION

Fogmaster's Sentinel-5850 barrel-room humidification system brings innovative atomization technology to small- and mid-size wineries. It uses a turbulent-vortex nozzle to atomize water into micro-droplets that evaporate quickly and spread uniformly throughout the barrel room.

The control unit (see photo) monitors relative humidity and regulates water flow. A regenerative blower, designed for efficiency and low-maintenance cost, provides air to atomize water.



When humidity drops below the set point, the control unit activates the system and the nozzle ejects a fog of tiny droplets. The droplets evaporate quickly and raise humidity so barrels stay dry. Because the nozzle has no tiny orifices, nozzle plugging is not an issue.

Designed for "do-it-yourself" installation, the Sentinel-5850 includes all installation components except the two-inch PVC pipe needed to convey air from the blower to the nozzle.

A single nozzle system can maintain a 5,000-sq.ft. barrel room. A cart option is available for user mobility.

For more information, contact:
Fogmaster Corporation
1051 SW 30th Ave.
Deerfield Beach, FL 33442
tel: 954/481-9975; fax: 954/480-8563
e-mail: info@fogmaster.com
website: www.fogmaster.com

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AAQUATOOLS

AaquaTools has been providing water-driven cleaning tools to wineries for more than 20 years. AaquaTools' success is a result our ability to fill sanitation voids with high-pressure, low-flow, specialty cleaning tools that clean quickly with minimal amounts of water.

AaquaTools, Inc.
wine supply and sanitation

AaquaTools' AaquaBlaster series of self-propelled cleaning tools are used to wash barrels or tanks. Robust and reliable, the AaquaBlaster successfully cleans with hot water (up to 185°F) and high impingement.

AaquaTools' HotCart portable propane-fired hot water generator/high pressure washer provides hot water (up to 180°F) for domestic or high-pressure applications. Fired by clean burning, energy-efficient, "tankless technology" and, coupled with a KEW Poseidon pump and motor assembly, HotCart outperforms dirty, odorous, diesel-fired pressure washers.

The KEW Poseidon is a perfect driver for all water-driven tools. Designed as a cold water electric-pressure washer, the Poseidon receives hot water (up to 185°F) while delivering up to 2,750 psi @ 5.5 gpm.

AaquaTools offers ozone and steam generators, water-driven floor cleaning attachments, and many more effective cleaning tools.

For more information, contact:
AaquaTools, Inc.
toll free: 800/777-2922; fax: 916/635-8856
Napa/Sonoma: 707/558-9100
Sacramento: 916/635-2922
3233-B Fitzgerald Rd.
Rancho Cordova, CA 95742
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VINO VESSEL, INC.

Vino Vessel, Inc. is a concrete solution for winemaking. The predesigned tank capacity ranges from 150 gallons to 1,200 gallons. Vino Vessel can produce custom-design vessels built at the production facility or at the winery.

Vino Vessel is the ultimate neutral storage option. Vino Vessel's custom-designed concrete mixture allows the fruit to stand forward, resulting in distinguished wines with the vineyard profile in place. Vino Vessels are very well insulated due to the thermal qualities that concrete is prized for, resulting in excellent temperature retention and control during fermentation and aging.

All Vino Vessels come standard with: 2-inch tri-clover racking port; 2-inch tri-clover drainage port; 16-inch x 21-inch front access door, and 16-inch to 20-inch round top access door. Some additional features include tasting port, thermal well, and top access doors ranging in size up to 55 inches.

Vino Vessel leg design is state-of-the-art, taking into consideration seismic conditions and each customer's location. Legs can be made any size or shape needed to achieve adequate working height from floor.

For more information, contact:
Vino Vessel, Inc.
3850 Ramada Dr., #C2
Paso Robles, CA 93446
tel: 805/238-2676; fax: 805/238-9098
Micah Utter — President / CEO
tel: 805/610-1936
e-mail: micah@vinovessel.com
Ryan Render — Sales Consultant
tel: 805/391-3286
e-mail: ryan@vinovessel.com
Steve Edmunds — Sales Consultant
tel: 707/337-6444
e-mail: steve@vinovessel.com
website: www.vinovessel.com

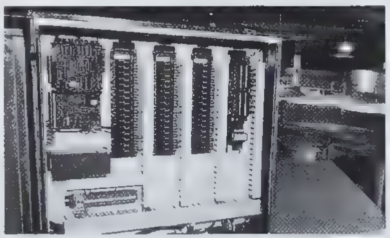
PLEASE SEE VINO VESSEL AD, PAGE 55.

LOGIX

Logix Winery Control Systems (WCS) provide energy-efficient operation of refrigeration related equipment, with documented savings in excess of 40%. The Logix WCS monitors and manages loads to minimize energy use, coordinating the demand and supply side of a winery's refrigeration system to provide cooling at the lowest possible energy consumption.

LOGIX

The Logix WCS is specifically designed for the demands of winery control applications, providing integration and control of wine tanks, compressors, chillers, air units, CO_2 monitoring/fresh air exchange, wastewater management, and more. The Logix WCS modular design provides easy expansion to cover additional equipment as your facility grows.



The Logix TC-2000 electronic thermostat with NEMA-4X waterproof enclosure provides stand-alone single- or two-stage cooling and/or heating control of wine tanks. The TC-2000 can also be networked for integration with a Logix Winery Control System. All operating data and alarms are logged and available for plotting and reporting.

Logix draws on more than 15 years of control system design and installation in the U.S. and around the world. Current winery installations in Washington state include Chateau Ste. Michelle, Columbia Crest; Hogue Cellars, and Novelty Hill/Januik. California winery installations include: Turner Road Vintners, Opus One, Franzia, Merryvale/Starmont, St. Francis Winery, and Woodbridge Winery.

For more information, contact:
Logix
10518 NE 68th St., Ste. 103
Kirkland, WA, 98033
tel: 425/828-4149; fax: 425/828-9682
e-mail: contact@logix-controls.com
website: www.logix-controls.com

PLEASE SEE LOGIX CONTROLS AD, PAGE 37.

KLR Machines, Inc.

KLR Machines, a subsidiary of Bucher Vaslin, offers a complete line of Bucher Vaslin equipment developed by expert factory technicians, and designed to work in-line from grape reception through processing. KLR responds to the needs of the wine industry with new technologies and innovation, and varied equipment capacities to accommodate small, medium, and large wineries.

KLR offers the new Bucher XPlus line of presses, from 22 HL to 80 HL capacity. The ORGAN™, available on all Bucher XPlus models, is an extension of Bucher Vaslin's proprietary ORTAL™ software, which allows for perfect press extraction according to winery needs and grape variety.

Excellence and innovation continue in the Delta Reception range of equipment. The Delta Vistalys® optical sorting line was introduced in the U.S. in the 2009 harvest. The Vistalys® optical sorting line allows wineries to increase quality while sorting at 2 to 10 tons/hour. High-quality destemming continues with the Delta Destemmer range, whose features accommodate a wide range of vintage variations and grape varieties.

KLR Machines has distribution partnership with Vance Metal Fabricators in Geneva, NY for northeast North America, while serving the Pacific Northwest directly. KLR and Vance Metal Fabricators can be contacted through klrmachines.com, or by calling 707/823-2883.

For further information, contact:

KLR Machines, Inc.
350 Morris St., Ste. E, Sebastopol, CA 94572
tel: 707/823-2883; fax: 707/823-6954
website: www.klrmachines.com

PLEASE SEE KLR MACHINES AD, PAGE 65.

ITT-Jabsco

Jabsco flexible impeller pumps offer wineries a gentle, versatile, cost-effective solution for all pumping tasks throughout the winemaking process.

The main criterion for pumps in winemaking is the ability to protect the transferred product during all winemaking steps in order to retain the character of the vineyard in the wine. The secret to successfully handling the fragile liquid comes from a technology that was first introduced by Jabsco more than 60 years ago — the flexible impeller pump.

JABSCO®

The Jabsco flexible impeller pumps are multi-use pumps able to handle tasks from must transfers to pumpovers, with capacities from 8.9 to 128 gallons per minute (1-inch, 2-inch, and 2.5-inch tri-clamp ports). The minimal meshing action and low speed capability allows both viscous fluids and solid particles to pass through without damage.

These positive displacement pumps are built with high-grade stainless steel and a hygienic rubber impeller that makes them easy to clean and service.

Both large and small wineries find that one pump that can satisfy several applications is a good investment; the flexible impeller pump provides this versatility and is a cost-effective solution.

For more information, contact:

ITT-Jabsco
1 Kondelin Rd., Gloucester, MA 01930
tel: 800/235-6538
e-mail: jabsco.sanitary@itt.com
website: www.jabscowinepumps.com

PLEASE SEE JABSCO AD, PAGE 25.

Silver State Stainless, Inc.

Silver State Stainless manufactures custom stainless steel tanks using high-quality fabrication services and craftsmanship, combined with high customer value and on-time delivery.

SILVER STATE STAINLESS

Silver State Stainless offers these features and options on their tanks:

- Choice of metals: 304 or 316;
- Various heating and cooling options;
- Custom configurations;
- Process piping and agitation units;
- Easy-to-use and versatile, variable capacity tanks;
- EPDM gasketing system with a softer, more pliable durometer for easy sealing and removal;
- Universal clamping system on removable-top tanks, allowing the lid to be applied from any position in a 360-degree radius;
- 110-volt electrical cable winch arm and boom for easy top-access;
- Polished integrated leg system with adjustable footpads;
- Lower tank bracing and cross members (¼-inch thick), for structural soundness and easy repositioning.

Silver State Stainless has incorporated the latest technology in automated resistance welding, and designs and manufactures tanks to exact engineered specifications. Heating and cooling jackets have been pressure-tested to 600 PSI, with a working pressure of up to 250 PSI.

For more information, contact:

Silver State Stainless, Inc.
12 Industrial Pkwy., Ste. E1
Moundhouse, NV 89706
tel: 775/246-1180; fax: 775/246-1183
e-mail: sales@silverstatestainless.com
www.silverstatestainless.com

PLEASE SEE SILVER STATE STAINLESS AD, PAGE 78.

EURO-MACHINES, INC.

As a leading supplier to North American wineries, Euro-Machines will extend its product range in 2010, with new equipment including custom-made tanks and conveyors.

All-stainless steel tanks (open top, multi-chamber, and storage), are specifically manufactured for Euro-Machines, and available from 25 to 25,000 gallons.

New conveyor belts will be manufactured specifically for Euro-Machines by Scharfenberger Company of Germany. Standard features include:

- Open construction for easy cleaning;
- All stainless steel;
- Variable frequency drive for gentle moving, with motor mounted on top for better leverage;
- Conclave belt cleats.

Customization is possible with individual sizes available, different hopper sizes, and much more.

After moving to a new facility in Fairfield, CA, which has doubled its usable space, Euro-Machines presents a new corporate identity, including a new logo.

Euro-Machines, the U.S. subsidiary of Scharfenberger Company of Germany, is committed to excellent customer service. Warehouses and service vehicles are fully stocked with spare parts so that Euro-Machines' knowledgeable and highly-trained technicians may provide timely service to customers.

For more information contact:
Euro-Machines, Inc.
497 Edison Ct., Suite G, Fairfield, CA 94534
tel: 707/864-5800; fax: 707/864-5879
e-mail: karen@euromachinesusa.com
website: www.euromachinesusa.com

PLEASE SEE EURO-MACHINES AD, PAGE 49.

WESTEC TANK & EQUIPMENT

Westec Tank & Equipment has 29 years of industry-leading technology and experience providing custom-designed and manufactured stainless steel tanks, catwalks and stairways, OxBoxes, and equipment for the wine and beverage industries. For a large wine consortium or a small startup winery, Westec offers one-on-one expertise and insight from helpful, knowledgeable, and experienced professionals.

Westec is on the forefront of the newest styles and designs. The equipment is technologically advanced, well-built, easy-to-maintain, safe, and aesthetically appealing. For wineries needing design advice and guidance, Westec can help plan enhancement and expansion projects.

Westec knows the success of a winery depends on doing the job right and on time — every time. At Westec, a reputation for honest, reliable, friendly service has been built by meeting and exceeding expectations, year after year.

Westec's new Portable Tank is the perfect solution for overflow, small lot production, or transportation. The high-quality stainless steel Portable Tanks are stackable (up to three tanks high) to save floor space. Standard designs have a 24-inch Westec top door, with optional 13x17-inch rectangular bottom door, available in 350, 450, and 550 gallon sizes.

THE BELLI CORPORATION WESTEC TANK & EQUIPMENT CO

For more information, contact:
Westec Tank & Equipment
Joe Belli, Jim Belli, Mark McDowell
1402 Grove St., Healdsburg, CA 95448
tel: 707/431-9342; fax: 707/431-8809
e-mail: info@westectank.com
website: www.westectank.com

PLEASE SEE WESTEC TANK AD, PAGE 47.

SCOTT LABORATORIES, INC.

For the 2009 harvest, Vaucher-Beguet presented the Mistral 100 New Generation, which blended the previous two-piece version into one compact chassis. The result is a more compact and simple installation of the award-winning grape sorting technology, capable of up to five tons per hour. For 2010, Vaucher-Beguet has applied the same frame integration to the 10-ton per hour Mistral 140 NG.

The extremely popular Armbruster Rotovib 10 technology has now been extrapolated into a new model, the Rotovib 20, a machine capable of gentle, whole berry destemming (up to 20 tons per hour). For the mid-size winery, this provides the opportunity to employ automatic grape sorting equipment at lower production levels. Adjustments are sensitive enough to leave raisins or immature berries on the stems.

The latest innovation from MBF bottling equipment is universal change parts. These are not simply *adjustable* stars, but ***self-adjusting*** stars and feed screws controlled by the operation panel. For most common bottle sizes, the only parts that need to be changed are entry screws and corker back guides. This saves a lot of time in changeovers, and money in stars and screws.

For more information, contact:
Scott Laboratories, Inc.
2220 Pine View Way, Petaluma, CA 94954
tel: 707/765-6666; fax: 707/765-6674
e-mail: info@scottlab.com
website: www.scottlab.com

PLEASE SEE SCOTT LABS AD, PAGE 18.

SMART FOG INC.

The Smart Fog system allows winemakers to significantly reduce wine evaporation and control alcohol content. This provides significant savings in topping costs, both in terms of wine loss and labor. Additionally, maintaining high relative humidity preserves the wine barrels in good condition, preventing cracks. Smart Fog de-correlation technology uses 50% less energy to generate the same humidity.

Smart fog®

Smart Fog provides the following unique advantages:

- 4.2 micron droplet size which means no free water and no wetness;
- Smart Fog® AirNET technology with the industry's only droplet and air spacing;
- Low-pressure safe system of only 100 psi of compressed air;
- Removes the dust and pathogens in the air;
- Simple and quick installation;
- No maintenance, no clogging (with the ZeroTDS filter, only replace elements every two years);
- Industrial PLC non-relay control;
- Precise relative humidity control;
- Low voltage 24VDC control less than 2A;
- Award-winning support and customer service.

For more information, contact:

Smart Fog Inc.
561 Keystone Ave., Ste. 686, Reno NV 89503
tel: 800/921-5230, or 775/954-0070
fax: 877/594-7125
e-mail: ido@smartfog.com

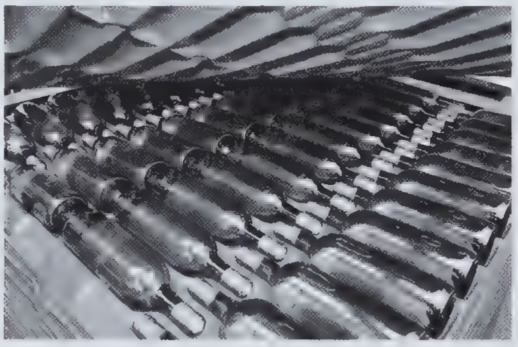
PLEASE SEE SMART FOG AD, PAGE 75.

SPEC TRELLISING

Cella-Stac is a palletized, modular system for storing bottled wine. Cella-Stac is comprised of layers of thermo-formed, food-grade plastic sheets, between which finished bottles of wine are safely stored. Cella-Stac 48CS accommodates 48 bottles per layer and Cella-Stac 40CS accommodates 40 bottles per layer. Both sizes work with most bottle types.

Because of the individual bottle cavities, there is no bottle-to-bottle contact, so breakage is less than with traditional bottle storage techniques, with good airflow between bottles. As each tray is filled, a new layer is placed on top, until the pallet is complete.

Cella-Stac CS48 can safely contain up to 14 layers (672 bottles) and stack up to three pallets (2,016 bottles) high. Cella-Stac CS40 can safely contain up to 14 layers of 40 bottles (560 bottles). Cella-Stac has a life expectancy of up to 15 years.



Cella-Stac offers wineries convenience and logistical benefits including:

- Occupational health and safety benefits;
- Reduced handling costs;
- Reduced BVS closure damage and bottle scuffing;
- Improved inventory control;
- Greater use of warehouse space.

For more information, contact:

Spec Trellising
39 Indian Drive, Ivyland, PA 18974
tel: 800/237-4594; 215/322-5588
fax: 215/357-3122
e-mail: info@spectrellising.com
website: www.spectrellising.com

PLEASE SEE SPEC TRELLISING AD, PAGE 68.

PRO REFRIGERATION INC.

Pro Refrigeration is a leading manufacturer and supplier of refrigeration equipment to the wine industry. Pro's mission is to build the highest quality, most efficient chiller systems for the markets they serve. Pro strives to not only provide a turnkey solution for the larger production wineries, but also be the best solution for wineries of all sizes.

ChilStar
CHILLER • SYSTEMS ™

Pro Refrigeration offers a new line of compact systems: The ChilStar™ Micro Chiller System is available in 2 HP, 3 HP, and 5 HP models. These systems can control up to five fermentation tanks of varying sizes and have the ability to operate at a 20°F chilled glycol temperature for cold settling and cold stabilizing duties. Pro Refrigeration offers this line as a solution for wineries working with limited production, and an affordable option that a large producer can utilize for individual tank control.

Pro is fortunate to have collaborated with some of the finest winemakers to develop and expand a product line specifically for the winemaking craft.

For more information, contact:

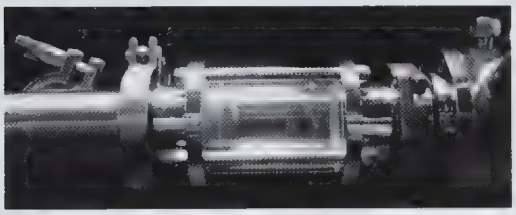
Pro Refrigeration Inc.
326 8th St. SW, Auburn, WA 98001
tel: 253/735-9466; toll-free: 800/845-7781
fax: 253/735-2631
e-mail: info@prorefrigeration.com
website: www.prochiller.com

PLEASE SEE PRO REFRIGERATION AD, PAGE 70.

ARS/PRESSURE WASHER COMPANY

ARS extends its leadership in steam sanitization and sterilization equipment, with the introduction of the SWASH™ pipeline product recovery and sanitizing system. The system is made up of four components: an FDA grade silicone "pig;" a "launcher" with connections for compressed air and for steam to attach to process piping; a "retriever" to catch the pig downstream on the process piping with a site glass for visual confirmation of cycle completion; a pressure gauge and pressure relief valve; and a pressurization accessory to turn the process piping into an autoclave capable of achieving medical-grade sterilization of the process piping. The system is highly affordable and available in all standard sanitary piping sizes.

The Miele G7859-W dishwasher now has a proprietary Bordeaux style wine glass insert that securely holds larger crystal wine glasses in a totally self-draining position, permitting more effective drying.



From Fogmaster Corporation, a zonal array of barrel room humidifiers is now available for use of the Sentinel 5850 barrel room humidifier in large warehouse facilities. Options include dual head nozzles, and a new portable mounting system which can double for fruit fly abatement spraying.

The ARS showroom is open by appointment. Call for demonstrations.

For more information contact:
ARS/Pressure Washer Company
1184 Maple Lane, Calistoga, CA 94515
tel: 707/942-8330; fax: 707/942-8337
e-mail: info@arsenterprises.com
website: www.cleanwinery.com

PLEASE SEE ARS ENTERPRISES AD, PAGE 28.

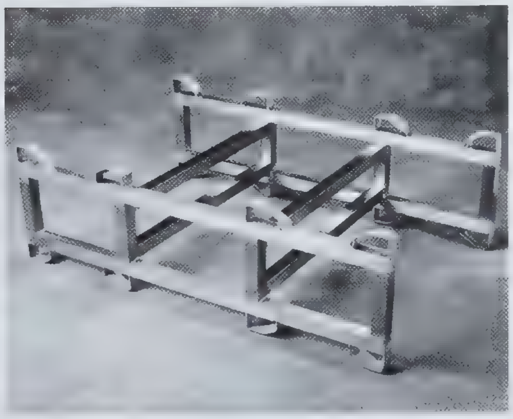
G.W. KENT, INC.

G.W. Kent has supplied wineries, breweries, and beverage industries since 1985. The company has a catalog and an online store with a full line of winery equipment and supply needs, including:

- destemming, crushing, and sorting equipment;
- refractometers and other testing instruments;
- bins;
- presses;
- tanks;
- valves;
- fittings;
- filters;
- pumps;
- gauges;
- corkers and fillers;
- corks;
- capsuling and labeling machines

and more!

G.W. Kent stainless steel barrel racks have replaced many rusty metal barrel racks in wineries all over the U.S. In addition to offering racks that outshine the competition, G.W. Kent offers competitive prices and quick delivery from stock, or custom production. By reducing winery labor and maintenance costs, stainless steel racks are an investment that pays for itself in less than three years.



Shop for racks and much more. Order a catalog or shop online at gwkent.com.

For more information, contact:
G.W. Kent, Inc.
506 S. Huron, Ypsilanti, MI 48197
tel: 800/333-4288, or 734/572-1300
e-mail: info@gwkent.com
website: www.gwkent.com

OGLETREE'S, INC.

For 64 years, Ogletree's has specialized in custom fabrication of winemaking equipment. By relying on the continual pursuit of innovation and the company's historical stability, Ogletree's is able to optimize value and quality to satisfy the wine industry's needs, while providing customers with the security that the job will be done right the first time.

Ogletree's manufactures high-quality hoists, receiving hoppers, belt and screw conveyors, sorting systems, bin dumpers, transfer lines, catwalk systems, and more. Ogletree's provides maintenance on all equipment offered.

Ogletree's has added two new bin dumpers to the product line. One uses a 110-volt linear actuator to dump, eliminating expensive, bulky hydraulic systems. It also features a gate to provide superior metering by holding grapes, releasing them in small amounts. Another bin dumper can be loaded by pallet jack or forklift, and is designed for direct-to-press feeding. It also can be upgraded to feed both doors of a two-door press.

Ogletree's years of service to the wine industry serves as a foundation to its design team, who design a superior product by collecting input from clients and focusing on specific needs. By utilizing solid quality-control procedures and a precise six-point inspection, Ogletree's team of experienced fabricators deliver products second-to-none.

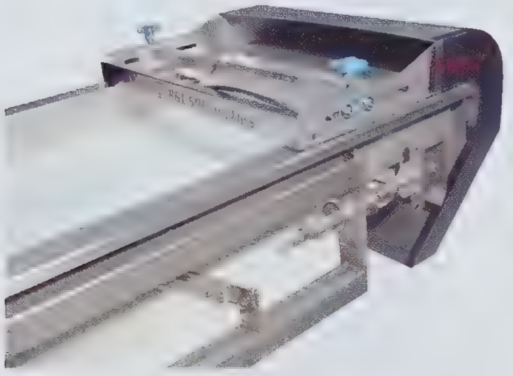
For more information, contact:
Ogletree's, Inc.
935 Vintage Ave., St. Helena, CA 94574
tel: 707/963-3537; fax: 707/963-8217
e-mail: samp@ogletreecorp.com
website: www.ogletreecorp.com

PLEASE SEE OGLETREE'S AD, PAGE 74.

P&L SPECIALTIES

P&L Specialties has received a U.S. patent on the Le Trieur™ (LT) line of MOG separation machines. The LT™ is available in sizes ranging from 5 tons to 60 tons per hour throughput. The patent includes the LT's special separation screen technology and gentle oscillating action.

The machines feature interchangeable separation screens of varying size for different grape varieties, and variable speed control for accurate control of separation, making the LT a good choice for wineries processing different red varieties, and seeking precise separation results.



The new RAKE™ is low-cost, no-labor, air knife technology designed to be used between the LT™ and a post-destemmer sorting table. The RAKE™ is described by its designer as "a lot of extra hands" removing vegetative pieces before final inspection on a post-destemmer sorting table. The RAKE™ requires no electricity, no water, and is whisper-quiet. It attaches easily to plant air.

The new Consista-Flow™ 5 ton-per-hour whole cluster destemmer feed conveyor is designed to eliminate the smashed grapes, stemmed clusters, excessive jacks and stem pieces caused by overloading and uneven feeding of the destemmer. The RMV (rubber-modified vinyl) belt and easy-to-sanitize design enhance the Consista-Flow's performance.

For more information, contact:
P&L Specialties
1650 Almar Pkwy., Santa Rosa, CA 95403
tel: 707/573-3141; fax: 707/573-3140
e-mail: sales@pnlspecialties.com
website: www.pnlspecialties.com

PLEASE SEE P&L SPECIALTIES AD, PAGE 52.

SANITARY STAINLESS WELDING, INC.

Sanitary Stainless Welding, Inc. manufactures custom fabricated storage and fermentation tanks for the wine industry. Tank sizes range from 250 gallons to 700,000 gallons.

Options include, but are not limited to:

- dimple jackets;
- channeled jackets;
- manways of various sizes;
- sample and racking ports;
- a variety of fittings and valves.

Tanks are offered with sloped or conical bottoms to sit on either metal or concrete bases. Tank Tops include off-center, truncated or centered, conical tops.

Sanitary Stainless Welding, Inc. offers custom-design catwalks in either stainless steel or aluminum. The company also offers "tube in tube" heat exchangers, grape receiving hoppers, screw conveyors, tubing line installation, crusher repairs, press repairs, tank modification, and tank repairs.

Sanitary Stainless Welding, Inc. was founded in the original Valley Foundry facility in 2004, to be a premier tank construction solution.

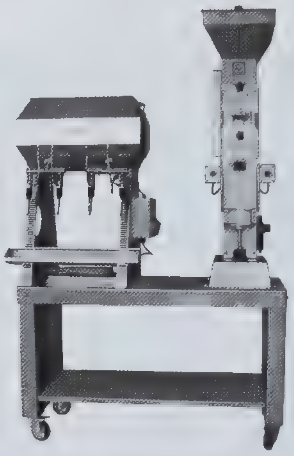
For more information, contact:
Sanitary Stainless Welding, Inc.
2550 S. East Ave., Ste. 101-B, Fresno, CA 93706
tel: 559/233-7116; fax: 559/233-7172
e-mail: jimm@sanitarystainless.com

PLEASE SEE SANITARY STAINLESS AD, PAGE 69.

NAPA FERMENTATION SUPPLIES

Napa Fermentation Supplies offers a full line of winemaking equipment and supplies, including variable capacity stainless steel tanks with adjustable lids from 26 gallons to 2,693 gallons and closed-top tanks from 79 gallons to 5,221 gallons, with or without manway, and with or without cooling jackets.

Also available are: Karcher hot water pressure washers with 1,300 psi to 3,000 psi and temperatures from 86°F to 285°F steam; one-inch and 1.5-inch Jabsco pumps with AC inverter drive; two-inch or three-inch Zambelli must pumps with AC inverter drive; Zambelli crusher/destemmers from two to 14 tons per hour; Zambelli manual and hydraulic, membrane, and bladder presses; eight-inch and 16-inch Zambelli plate filters; a full line of stainless steel fittings and valves, butterfly and ball; one-inch to four-inch wine hose; labware; refractometers; wine thieves; and table-top labelers.



Tivoli corking/filling machine, made of AISI-304 stainless steel, has four jaws for use with synthetic or natural corks with 22, 24, or 26mm diameter. The corking pin has a pneumatic piston, inserting rapidly to create less pressure on bottleneck, and the cork hopper has mechanical agitator for continuous cork feed. The four-spout filler has high/low fill sensors, comes with or without vacuum, 110 VAC, and will fill 500 to 600 bottles per hour.

For more information, contact:
Napa Fermentation Supplies
575 Third St., Bldg. A, Napa, CA 94559
tel: 707/255-6372; fax: 707/255-6462
website: www.napafermentation.com

PLEASE SEE NAPA FERMENTATION AD, PAGE 74.

ST. PATRICK'S OF TEXAS

St. Patrick's supplies equipment for small to mid-size wineries from three warehouses (35,000 square feet) in Austin, TX. Product descriptions and pricing are available online at www.stpats.com. Equipment manuals are also available online.

St.Patrick's of Texas

St. Patrick's of Texas stocks the following equipment:

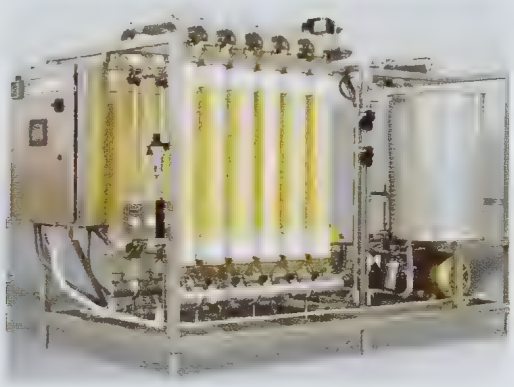
- NIKO pneumatic membrane presses;
- MEP semi-automatic corkers;
- MEP semi-automatic labelers;
- Wine tanks;
- EnoItalia crusher/destemmers;
- Sanitary valves and fittings;
- Barrel tools;
- Filling machines;
- Plate and frame filters;
- Membrane filters;
- Wine and must pumps;
- Heat-shrink and foil applicators.

For more information, contact:
St. Patrick's of Texas
1828 Fleischer Dr., Austin, TX 78728
tel: 512/989-9727; fax: 512/989-8982
e-mail: stpats@bga.com
website: www.stpats.com

PLEASE SEE ST. PATRICK'S AD, PAGE 102.

KOCH MEMBRANE SYSTEMS

Koch Membrane Systems, Inc. (KMS) offers hollow fiber crossflow microfiltration (CMF) systems designed specifically for use in wine clarification. The newest product is a tubular microporous membrane for use in exclusively designed KMS crossflow lees filtration systems. This system can be utilized for high-quality juice recovery from sweet lees, or wine from fermented or racked lees.



KMS Leesfilter crossflow microfiltration system

With KMS crossflow filtration, a feed stream flows parallel to the membrane surface at high velocity, as compared to the perpendicular flow path employed in conventional depth filtration. Suspended material remains in circulation and is not deposited on the media surface as is the case with traditional vacuum, and plate-and-frame devices. The result is long and stable runs without the need for diatomaceous earth or other filtration media. Additionally, since the KMS design employs a closed system, there is little or no oxygen pickup and the recovered juice or wine quality is equal to the feed material.

KMS systems are flexible and efficient, available in batch or continuous designs that are manual or fully automated, and can be custom-engineered for individual winery needs.

For more information, contact:
Koch Membrane Systems
850 Main St., Wilmington, MA 01887
tel: 888/677-5624
e-mail: info@kochmembrane.com
website: www.kochmembrane.com

COLLOPACK SOLUTIONS

ColloPack Solutions is a leading provider of bottling equipment and grape processing systems. ColloPack's premium line of bottling equipment, from single machines to complete integrated lines, includes the Bertolaso cleaner/filler/corker/capper bloc, Robino & Galandrino capsuling equipment, Cavagnino & Gatti PS and wet glue labelers, Francesca pumps, CIVision inspection systems, and Bertolaso automated conveying systems.

ColloPack provides engineering, project management, installation of equipment, and comprehensive after-sales service, including a large inventory of replacement parts, equipment repair, training and maintenance programs customized to each winery's needs.

Diemme, a leading manufacturer of grape presses and grape conveyors, is also represented by ColloPack. Diemme's product line includes Kappa destemmer/crushers (8 to 150 tons per hour); Kappa grape sorting and conveying systems, including belt and vibrating conveyors and belt elevators; Membrane presses (1,500 to 75,000 liter capacity); Vintage basket presses (500 to 2,300 liter capacity); and Enotork continuous presses (620 to 1,200 mm diameter).

For more information please contact:
ColloPack Solutions
Dave Means, Phil Giacalone, Rick White,
Joe Mironicki, Tom Kennedy (Northwest),
Scott Irwin (Central Coast),
Craig Richardson, or **Greg Fulford**
193 Camino Dorado, Napa, CA 94558
tel: 707/258-3940; fax: 707/258-3949
e-mail: sales@collopack.com
website: www.collopack.com

ELECTRO-STEAM GENERATOR CORP.

Electro-Steam Generator Corp. has manufactured all-electric steam generators since 1952.

The generators operate at 98% efficiency and produce culinary-grade steam. They are designed for point-of-use placement or with portable mounting. Some of the many uses include: sterilization of bottling lines, dissolving tartrates, barrel maintenance, and general cleaning.

Water use is drastically reduced to only a few gallons per hour, not per minute.

Because there is no flame, Electro-Steam generators are safe to operate, resulting in lower insurance costs. Basic maintenance will extend the life of an Electro-Steam unit by many years.

Each generator is hand-built to meet each winery's requirements. The units are manufactured under the ASME Code, are National Board of PVI Shop-Inspected, and UL. CSA certification is provided upon request.

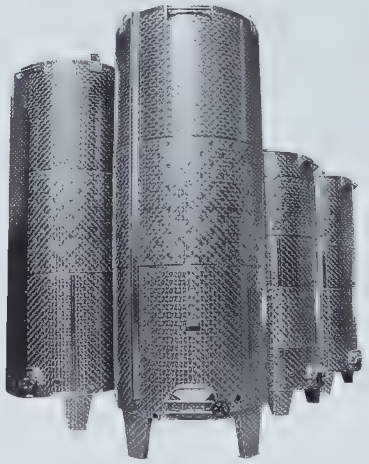
For more information, contact:
Electro-Steam Generator Corp.
PO Box 438, Rancocas, NJ 08073
tel: 866/617-0764; fax: 866/617-0765
e-mail: jharlin@electrosteam.com
website: www.electrosteam.com

PLEASE SEE ELECTRO-STEAM AD, PAGE 57.

RAYNOX 2000, INC.

Fabricating stainless steel tanks for the winery and agri-food sector is Raynox's core business.

From well-designed standard models, to carefully crafted custom tanks and on-site fabrication, Raynox has assisted North American wineries of all sizes. Raynox builds every tank sold, ensuring quality and craftsmanship meeting high standards. Raynox repeat customers especially value the post-sales service.



Raynox off-the-line standard tank models set an industry benchmark for red and white fermentation and storage tanks, with a variety of options to satisfy the most discerning winemaker. Custom fabrication expertise ensures Raynox can meet winemakers' exact needs, from a tank that fits the space, to a specialized dual fermentor.

Raynox offers a wide range of winemaking equipment selected with the same care used to manufacture tanks. From the sorting table to final labeling, Raynox has equipment to help winemakers every step of the way.

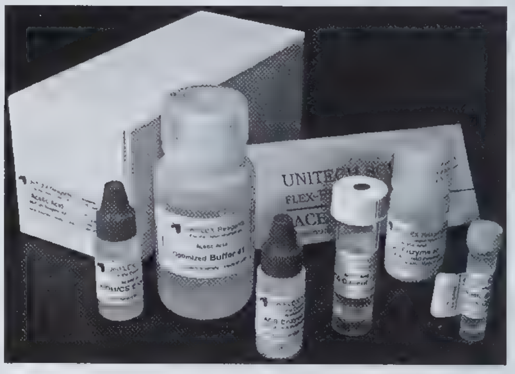
For more information, contact:
Raynox 2000 Inc.
Sales Department
1148 St. Michel Street, St-Cesaire
Quebec, Canada J0L 1T0
tel: 866/469-4181 (toll free)
fax: 450/469-2112
e-mail: lchartrand@raynoxinc.com
website: www.raynoxinc.com

PLEASE SEE RAYNOX AD, PAGE 57.

UNITECH SCIENTIFIC LLC

Unitech Scientific has been developing and manufacturing enzymatic wine reagent kits in California since 1996. The reagent line includes D-Glucose/Fructose, L-Malic, Ammonia, Primary Amino Nitrogen (NOPA), Acetic Acid — 20 reagents in all — plus multi-level standard sets, enzymes, NAD and other kit components.

Unitech reagents are intended for both spectrophotometers and Unitech's analyzers, including ChemWell (wine auto-analyzer) and the StatFax analyzers (spectrophotometer alternatives). ChemWell and StatFax read traditional enzymatic assays and enzyme immunoassays (histamine, ochratoxin). These open systems are easy to use, reliable, and utilize all of Unitech's reagents.



Unitech also provides instrumentation from YSI, Hanna Instruments, and Atago USA. Unitech recently launched a new "wine microbiology made easy" line for *Brettanomyces*, bacteria, and yeast detection, and provides Z-Brett — the 3-hour antibody-based test.

Unitech offers reagent, assay protocol, and hardware expertise. Unitech is proud of their great product quality, service, and customer loyalty.

For more information, contact:
Unitech Scientific LLC
12026 Centralia Road, Ste. H
Hawaiian Gardens, CA 90716
tel: 562/924-5150; fax: 562/809-3140
e-mail: geoff@unitechscientific.com
website: www.unitechscientific.com

PLEASE SEE UNITECH SCIENTIFIC AD, PAGE 80.

RLS Equipment Co., Inc.

RLS Equipment Company has provided wineries with quality equipment and service for more than 40 years. As agent for Kiesel, Amos, Strassburger, and Magitec, RLS can supply complete crushing and pressing facilities.

Kiesel progressive-cavity pumps are available in hopper and in-line styles from 1,000 liters per hour to 200+ tons per hour (tph). The Kiesel "corrugated" tube-in-tube heat exchangers can process from hundreds to thousands of gallons per hour, and save $$$ in energy costs.

Strassburger's MCC Crossflow Filtration system is a completely PLC-controlled unit that allows highly flexible control, and yields one of the lowest recirculation rates (less pumping of wine). Strassburger also offers high-quality plate/frame, and lees filters. S/S construction with either S/S or noryl plates are durable and easy to clean. A wide variety of filter pads is available.

The Magitec A-5 destemmer/crusher is designed for hand-sort/ultra low-capacity volume. Magitec's unique square-hole basket is available from 2.5 tph to 60+ tph capacity. Magitec offers a variable-speed, dual-drive system (basket/beater bar) on small units, and split machines with vibrator sorting tables between destemming and crushing.

RLS offers the Amos Engineering model ADM921 destemmer-crusher, with the performance and features of the original A-series, plus updated design/manufacturing. Amos Distribution offers a variety of affordable and effective sorting tables.

RLS offers domestically-produced OEM-material, replacement membranes for most presses, and an extensive used equipment listing.

For more information, contact:
RLS Equipment Co., Inc.
1017 White Horse Pike
Egg Harbor, NJ 08215
tel: 609/965-0074,
or West Coast: 800/527-0197
fax: 609/965-2509
e-mail: rls.equip@att.net
website: www.rlsequipment.com

PLEASE SEE RLS EQUIPMENT AD, PAGE 67.

Skolnik Industries, Inc.

Skolnik stainless steel cooperage is designed to meet the special needs of winemakers in all stages of fermentation, maturation, and storage of fine wines. Skolnik has a long and proud tradition of providing leading winemakers with stainless steel drums of high quality, durability, and design.

Skolnik's wine industry customers look to stainless steel cooperage to supplement oak barrels in key stages of the winemaking process. Stainless steel offers unique and unsurpassed qualities for preserving product integrity and purity — important considerations for why stainless is a key tool for winemakers.

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For more information, contact:
Skolnik Industries, Inc.
Jason Snow
4900 S Kilbourn Ave., Chicago, IL 60632
tel: 773/362-1913; fax: 773/735-7257
e-mail: jason@skolnik.com
website: http://winedrum.skolnik.com

PLEASE SEE SKOLNIK INDUSTRIES AD, PAGE 75.

CUNO Incorporated, a 3M company

CUNO is a world leader in the design and manufacturing of a comprehensive line of filtration products and systems for the clarification and final filtration of fine wines.

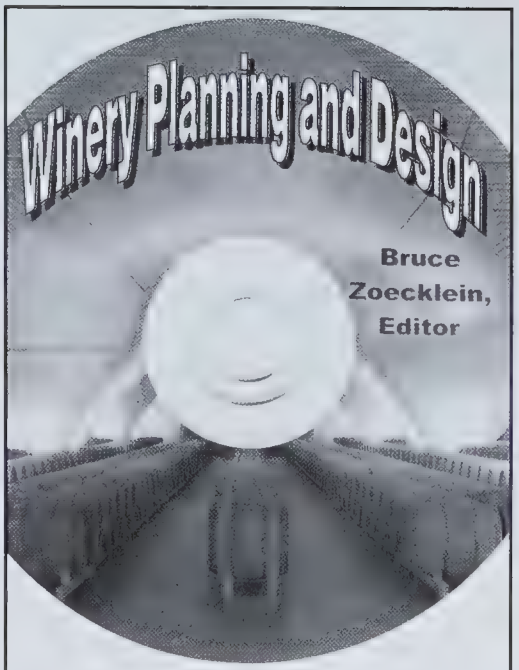
Innovative CUNO products for wine filtration include the first dual-zone clarification depth filter cartridge (Zeta Plus™ MH Series), the first integral multi-zoned membrane prefilter (LifeASSURE™), and the first nylon-based final membrane filter optimized for repetitive hot water exposure (BevASSURE™)

CUNO offers the BevASSURE BNA line of final membrane filters. BevASSURE BNA, a polyethersulfone (PES) membrane final filter that combines three innovative technologies from CUNO to significantly improve filter throughput and reduce operating costs. A highly asymmetric microporous membrane, a patented pleating design, and a novel, patent-pending support layer construction, deliver ultra-fast flow rates, secure spoilage organism retention, and remarkable throughput.

With more than 90 years of experience and manufacturing facilities on five continents, CUNO is uniquely suited to provide solutions to wineries worldwide.

For more information, contact:
CUNO Incorporated
a 3M company
400 Research Pkwy., Meriden, CT 06450
tel: 800/243-6894; fax 203/630-4530
e-mail: cjohara@mmm.com
website: www.cuno.com

PLEASE SEE CUNO AD, PAGE 12.



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A comprehensive work on CD which covers basic essentials of planning and designing a winery.

The latest edition provides access to five hours on sustainability (Adobe Presenter) and includes architecture layouts with examples.

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The CD is exclusively available from **PWV Bookshelf** for **$110.**

WINESECRETS

American Winesecrets LLC sells STARS technology to the North American wine industry. STARS (Selective TArtrate Removal System) uses electrodialysis technology to reliably remove tartrate salts from wine, providing cost savings by reducing energy consumption and wine loss, wine quality improvement through selective action, operational efficiency by working at a predictable rate, and reliable stability by continuous in-line monitoring of conductivity.

STARS models available include:

- ED-400 — 400 gal/hr of stable wine;
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Winesecrets provides North American wineries with new and eco-friendly wine technologies, answering the challenges of brand consistency, stylistic integrity, and environmental sustainability. Winesecrets is a partner in progressive wine craft today, and is a valuable resource for tomorrow's priorities.

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tel: 707/824-2022 or toll-free: 888/656-5553
e-mail: domingo@winesecrets.com
website: www.winesecrets.com

PLEASE SEE WINESECRETS AD, PAGE 56.

PULSAIR SYSTEMS, INC.

Pulsair's innovative "Pneumatage" is a proven method of managing the cap on red wine during fermentation. The process and equipment is being used worldwide to replace pumpover, punchdown, irrigation, and other conventional methods of cap management, to produce high-quality, more drinkable wine at low cost.

Pneumatage automates the fermentation cycle, leaving the winemaker to test, examine, evaluate, and taste the wine during fermentation, and not worry about the daily chores of turnovers, labor management, and paperwork.

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SYSTEMS, INC.

The Pulsair TM and PTM all-pneumatic portable mixers allow small wineries to turn the cap from the top of the fermentor, or through the racking port. The Wine Cart expands the ability of the TM and PTM mixers to include mixing of large tanks, in a semi-automatic mode.

The fully-programmable Pneumatage system will turn multiple tanks on a pre-determined time schedule for 14 days. More than 100 tanks can be operated from one central controller. When fermentation is completed, any Pulsair system can be used to quickly mix and blend, to create a great Estate Vintage.

For more information, contact:
Pulsair Systems, Inc.
tel: 425/455-1263; toll free: 800/582-7797
e-mail: sales@pulsair.com.

PLEASE SEE PULSAIR SYSTEMS AD, PAGE 40.

SMART VITICULTURE *by Dr. Richard Smart*

Stunning grape production book

I want to recommend what I think is one of the finest books I have ever read on practical vineyard management. *Wine grape production guide for Eastern North America* was edited by Dr. Tony Wolf, Professor of Viticulture at Virginia Polytechnic Institute and State University (Virginia Tech) and published by Natural Resources, Agriculture and Engineering Service Cooperative extension. It is available from www.nraes.org or the ***PWV*** Bookshelf for $75.

A major accomplishment, the book stands tall on the international stage as a practical guide to growing wine grapes. The 336-page book has 16 chapters and 16 authors, who include noted researchers and extension people from the eastern U.S. and Canada. Forty reviewers helped improve the final drafts. Tony Wolf not only managed the editorial task, but authored or co-authored 10 chapters, so the excellence of this publication should bring Tony much applause. Well-written and illustrated, it is a credit to all involved.

Viticulture in the eastern U.S. has much to gain from this book, and growers in the western states may well urge their academics and extension personnel to produce a similar one. In any event, they may want to purchase the eastern guide, as many of the principles apply both sides of the Rocky Mountains. There has been a substantial increase in growing vinifera in the east, so much is directly applicable.

Scope of the book

The book is relevant to today's grape production, covering all management procedures, including a few new ones, such as costs and returns of vineyard establishment, yield estimation, grape purchase contracts, and spray drift mitigation. The chapters are:

- Costs and returns of vineyard establishment and operation,
- Vineyard site selection,
- Wine grape and rootstock cultivars,
- Vineyard design and establishment,
- Pruning and training,
- Grapevine canopy management,
- Crop yield estimation and crop management,
- Nutrient management,
- Grapevine water relations and irrigation,
- Spray drift mitigation,
- Disease management,
- Major insect and mite pests of grapevines,
- Vineyard weed management,
- Wildlife deterrence,
- Grape purchase contracts and vineyard leases,
- Wine grape quality: when is it time to pick?

Tony Wolf's preface says that the book is suited for growers with some experience, but I imagine that it will be required reading for many undergraduate viticulture courses. While the volume, quality, and local appreciation of wines in the eastern U.S. are increasing at a pleasing rate, Tony emphasizes that successful growers will need to produce sustainable and sufficient yields of quality fruit, use more labor-saving practices, and be aware of the implications of a changing climate, which interestingly will be more beneficial to grapegrowing in the east than the west.

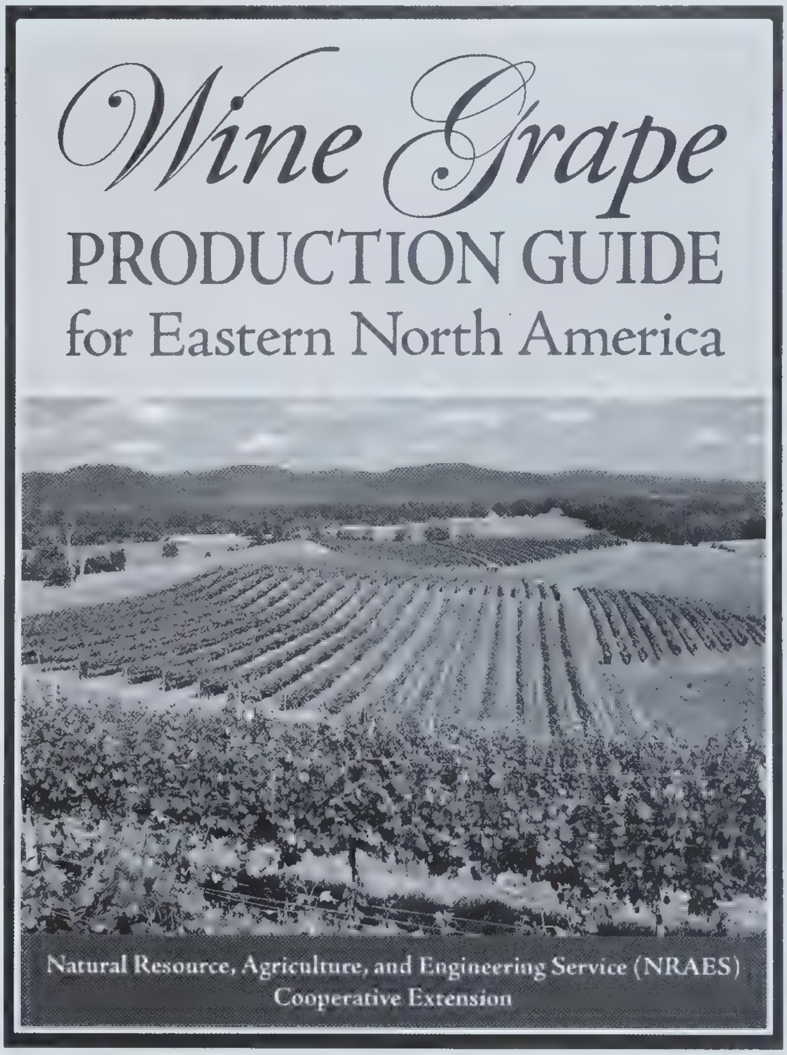
Highlights

I particularly liked the costs and returns chapter, as it emphasizes the key points of vineyard economics. Vineyards are expensive to establish, with trellis systems, grafted vines, an irrigation system, and a two-year period to train vines before cropping. This capital cost can also be substantially increased by equipment cost, especially for small vineyards that must buy new equipment.

Once in production, economics are dictated by yield and price per ton. The keys to profitable vineyards are large acreage to spread machinery costs, early and high yields, and good quality, which will receive a good price for grapes.

Vineyard site selection is very important in the east, as spring and fall frosts, lack of summer warmth, and winter freeze can all limit growth, yield, and proper fruit ripening. This important topic is well-covered and provides guidelines in general for cool climate viticulture.

The chapter on rootstock and wine grape varieties is very comprehensive. Rootstocks are well summarized according to their attributes, including adaptability to various soil conditions. The variety listing is complete and includes vinifera, American, and hybrid varieties, along with some clonal preferences.



Wine Grape
PRODUCTION GUIDE
for Eastern North America

Natural Resource, Agriculture, and Engineering Service (NRAES)
Cooperative Extension

For each variety discussed, strengths and weaknesses are listed, which is very useful to guide variety selection. The list is up-to-date, including newer releases like Chardonel and Traminette. Comprehensive tables list such attributes as potential wine quality and susceptibility to diseases.

The chapters on pruning and training and canopy management were written by Andy Reynolds of Ontario, Canada, and Tony Wolf, and have a very good balance between theory and practice for grapevine pruning, and various training systems are each discussed with advantages and disadvantages. They are well illustrated with diagrams and photos.

The chapter on nutrient management is especially informative. It is another nice balance of theory and practice, offering lots of practical tips, including tables showing how much lime to add to overcome acidity for various soil pH values. There is a good discussion of fertilizers to use to overcome deficiencies and critical levels for soil and tissue.

I particularly enjoyed the chapter by Andrew Landers of Cornell University (Ithaca, NY) on spray drift. How many of us can be accused of spraying our vineyards **and the surroundings**? And then we wonder why our neighbors are concerned about possible effects on their health. This chapter is full of practical considerations about minimizing spray drift, and I do not know another vineyard management book with such good information.

Think about this suggestion: If you use a simple tunnel shield over your sprayer (which is available), you can recycle 75% of your early season spray and average a 35% reduction in spray material over the season. What a savings! You can also reduce spray drift by 90% to 99%; think how that might make your neighbors more friendly.

Summary

I believe that this book will be an industry best seller. I am a frequent visitor to and admirer of the eastern wine region. I think it has a bright future. Why? Because the eastern industry is growing and thriving in the midst of one of the world's largest wine markets. In its quest to improve quality and reputation, there is a place for use of better technology. This book delivers it all. Tony and co-authors, I congratulate you on a splendid achievement.

Dr. Richard Smart, "the flying vine-doctor," is an international viticultural consultant based in Launceston, Tasmania, in Australia. He is accessible by e-mail: vinedoc@bigpond.net.au and telephone +61 418 656 480. Read about Dr. Smart's business, including his consulting schedule, educational wine tours, and seminars, at his home page http://www.smartvit.com.au. He visits America frequently and will be pleased to consult and deliver seminars in your region.

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Invite to Producers in USA and Canada

Doctor Richard Smart is rewriting the very successful book, *Sunlight into Wine*. The first edition was published in 1991 and has sold almost 19,000 copies. But the book is now in need of rewriting. There are new trellis systems to be considered, and a better understanding of vine and wine responses to improved canopy management are now available. The new *More sunlight into wine* book will be published in 2010. It is expected to be considerably longer and will be completely rewritten.

Doctor Smart is seeking articles from vineyard managers or winemakers who have had experience with canopy management. The testimonials and photographs in the first edition were an important reason why the book is so popular. Doctor Smart is asking any producers in the USA and Canada with relevant experience to please contact him at vinedoc@bigpond.net.au. ■

TOP TEN REASONS

A marketing plan is failing...

BY **Kurt Krause**

Winemakers need to give special attention to marketing in the current economic climate. A marketing plan is not something you can "set and forget" — it needs to be a living, breathing document. It needs to be tweaked and polished constantly, and it needs to be adaptable to changing conditions in the marketplace.

Reflecting on my 30-some years in the alcoholic beverage marketing business, I highlight here ten reasons why a marketing plan fails. I offer some general solutions to spark your thinking and help you create your own solutions to what may be lacking in your marketing plan.

10. *Your product is too fabulous*

Your wine is excellent; in fact it is fabulous. You can congratulate yourself, and rightly so, as you have worked hard and you deserve to be proud of your wine. How can I say that your product is ***too*** fabulous? It is if you let "fabulous wine" be your **sole** marketing theme.

Look around — aren't there a lot of terrific wines out there? Be honest and objective. Look at the wines in your state, in the country, in the entire world!

Quality products abound, and global distribution channels and communication make them widely available. But as a result, a quality product is a given in today's marketplace. It is expected. Your excellent wine and your pride in it are not going to move that wine out of your cellar and into the broader marketplace.

One of the nation's top marketers writes the following on this subject:

> "...they sail confidently into the marketing arena, secure in the knowledge that they have the best product and that ultimately the best product will win. It is an illusion. There are no best products. All that exist in the world of marketing are perceptions in the minds of the customer."
> From "Nine Major Marketing Mistakes" Jack Trout, Forbes.com

SUGGESTION: Yes, emphasize the quality of your wine in your promotional efforts, but face it: the fact that you have accomplished a fabulous product means you are running with the pack. Would you like your wines to get ahead of the pack? Now comes the hard part. You are going to have to do some creative marketing.

9. *Your wine is too popular*

The popularity of your wine can become a problem if you rely on it. Wine drinkers are notoriously fickle; fewer and fewer are brand-loyal. They are curious, and they are always searching for the next "find." They do want to find it — they do not want it shoved at them. Consequently wine marketing can be tricky. You cannot use in-your-face advertising or promotions. You have to carefully position yourself to be discovered, seemingly by accident.

A problem arises once you have been discovered and become popular. Then is not the time to congratulate yourself and enjoy the benefits. As quickly as you were discovered, you can just as quickly be dropped. A wine that is all the rage one year can turn into one that is common and passé the next, so last-year.

SUGGESTION: Pamper and take care of your current customers, but also constantly market to potential new customers. Aim your marketing effort at the younger generation. They are easier to convert. Their wine palate is growing and they are always looking for the new wine that explodes with the elusive "wow factor."

8. *Do not believe everything you think*

This is an interesting concept that is most often applied to "the other guy." It's human nature to want to point out to someone who disagrees with you: "Your perception is off, listen to me." This can be dangerous when it concerns your own wine. Wine is so personal to the maker, so much a part of himself or herself, it is easy to let ego get in the way of the message.

Will your wine win or lose in the marketplace because of its own merits? Most likely not. In the marketing of wine more than few other products, it is the perception of the wine's desirability, mystique, and uniqueness that will position it to be discovered by those looking to fulfill their own perception of the perfect find.

SUGGESTION: Shift your perception of your own wine; look at it from the point of view of thousands of wine lovers looking at thousands of wines. How will they perceive your message? How will they translate what you are offering to fulfill what they seek in a wine?

7. *A goal is just a goal*

It is a matter of definition. An example of a goal is: "I want my winery to be successful in 10 years." But that is not a plan.

An example of a plan is: "I am going to set aside X-dollars per week/month/year for marketing. I am going to spend one-third on rating services and competitions, one-third on print materials such as brochures and flyers, and one-third on advertising."

SUGGESTION: The exact proportions are not important. What is important is that you have a specific, detailed, and realistic plan.

6. *"I have a dream..."*

Look at your website, brochures, and flyers. How often have you said, "I am fulfilling my lifelong dream..." Or "I have a passion for this..." These expressions are so overused in this industry, yet they are at the top of the list of marketing errors. Marketing is not all about you. No, it must be all about your customers — what they need, what they want.

SUGGESTION: Read through your web pages and promotional materials. Do you see a lot of "I" and "me" expressions? Then you have an "I" problem. Fix it by specifying what it is about your wine that will make your customers feel happy and fulfilled.

5. *In every wine ... there is a great story*

Wine is history and romance. Wine is sexy. Wine is ... interesting! I am sure some people will want to know which side of the hill has more sunshine in late afternoons, but more people care about the romance of what you are offering. Even if your great-grandfather was not making wine on this very spot, there is more to your story than dirt and rain.

Do some research. Maybe 400 years ago a Conquistador's wife ran off with the local winemaker and settled on that hill over there, or maybe Zorro galloped across your valley to save the padre's vineyard. Find out and give the story to your customers. Customers want history and romance. Customers want "interesting."

A good story can create a bond between your wine and a potential customer. Would you shake hands with a stranger at a party and say immediately, "I'm quite a fine person, will you marry me?" Although accepting a marriage proposal is a little more serious than deciding on a wine purchase, a lot of people are intimidated and agonize over one wine decision as if it will be a lifelong reflection of their personal taste.

SUGGESTION: Give them a story ... a great story, a memorable story so they think of your wine in terms of history, romance, and human interest.

4. *Your pricing is out of whack*

Pricing is tricky and can have consequences. It is not easy to find the proper niche for your wines. Consider that a recent study (led by Antonio Rangel at the California Institute of Technology) found a direct correlation in the minds of consumers between price and taste of a given wine. Twenty volunteers were asked to rank their enjoyment of five differently priced Cabernet Sauvignons. What they did not know was that pairs of identical wines were classified as being from different price ranges. A magnetic resonance imaging machine was used to monitor their brain responses.

When asked to rank their enjoyment of the wines, volunteers liked the $90 wine best and the $5 wine least. Of the identical wines, the higher-priced wine was invariably perceived to taste better. The MRI brain scans bore these findings out.

SUGGESTION: The moral of this is again that perception is everything. Will raising your prices be the one answer to your future sales volume? Of course not, but neither will lowering your prices so that you compete with mass-market products. Think this over carefully.

3. *You are in competition with yourself*

A complication when marketing your wines through several channels is bumping heads with yourself. Be as careful about your pricing consistency as you are about your product quality. If a consumer can buy your wine directly from you and have it shipped to his or her home state for less money than it would cost in a neighborhood wine store — well, think about it. Why would the retailer, and thus the wholesale distributor, want to do business with you?

When you ship wine direct to your customer, you still have costs involved. It is easy to overlook all the hidden costs that are part of shipping direct from your website. You are not saving anything.

While I am on the subject of distributors, I hear a lot about what you do not like about them. You are the little guy, your product gets lost in their inventory, they do nothing for you.

My first response is to wonder what do you do for them? Do you presume they are your end customers? Do you ship them wine and then sit back and wait for their reorder?

SUGGESTION: Participate in your own success. Do you send your wholesalers marketing materials or a link to pdf downloads on your website? Do you participate in tastings and sales incentive programs? Or do you just assume you have done enough by supplying them with your wine?

Do not under-price your wine on your website. In the end, you will just confuse the customer and have him question your quality. You also will destroy the cooperation of retailers around the country that you will have to count on in changing economic times. For numerous reasons beyond your control, you will not always be able to sell your own wines in adequate quantities to stay in business. Keep all channels open.

2. *There is more than one right way to do anything*

I was mentored in my youth by an old German brewmaster who used that expression like a mantra. There is too much dithering about decisions in life, fretting about what to do, what not to do. This applies to your marketing plan.

Should I use magazine ads or website? Should I use this rating system or that one? Should I spend a dollar here or two dollars there?

SUGGESTION: Do something. Make a plan and carry it out. Stop dithering. Keep in mind that there is more than one right way to do anything. But you must do something.

Artisan Pinot Noir facility

Continued from page 28

wastewater. Installation costs are generally less than for package plant systems, and the system itself becomes a landscape feature that can enhance the site. Constructed wetland systems offer both physical and biological treatment mechanisms for a winery's process wastewater (PWW).

The intricate and expansive root systems intercept particulate matter from the PWW while providing a scaffolding for microorganisms that break down the dissolved constituents in the PWW. Energy to drive the system comes from the sun, and the treated water can be reused for landscape irrigation.

The constructed wetland is 12 feet wide and 54 feet long and designed to manage the PWW from up to 5,000 cases of wine per year. The treated PWW is stored in a 3,000-gallon tank to avoid irrigation during winter storms and to meter out the water for irrigation use during the dry seasons. This treated water provides up to about 75% of the landscape irrigation needs for the property.

Maintenance for the constructed wetland includes adjusting water levels during the first year or two of operation. Once the plants are established and the ideal water level attained, annual trimming of plants is required. Semiannual inspection of plants, irrigation lines, and the tank are necessary to ensure proper function, and occasionally some plants may need replacement.

NOTE: Heather Shepherd is part of the Sustainable H_20 Solutions consortium of four dedicated to providing water solutions for a sustainable future. E-mail contact: sustainableH20solutions@gmail.com.

Conclusion

Two harvests are now complete at MacPhail Family Winery and the facility is functioning well. The success of the design is a testament to the importance of collaborative planning and working with an owner who has a vision. ■

Top ten reasons

Continued from page 104

1. *Number One reason a Marketing Plan is failing? There is no plan!*

You are winging it! Make a plan, write it down, follow it. There is more than one right way to market your wine, but there is definitely a wrong way and that is to shoot from the hip. Act, do not react. Plan it and carry it out. Have a plan and execute, execute, execute! ■

Kurt Krause is a 35-year veteran of the beverage marketing industry, specializing in beer and wine. You can visit his blog ***Fluid Conversations*** *on line at http:// acorkabove.com/blog/ or email him at Kurt@ACorkAbove.com.*

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March 23-24

VINE SYMPOSIUM
CENTRAL COAST

Paso Robles Inn, Paso Robles, CA

Tuesday, March 23
8 AM Registration
10 AM Looking forward, Looking Back, A review of 2009 season and 2010 production issues (panel discussion)
Noon – Lunch (Exhibits Open)
1 PM Production & Viticulture
1:00 Grape Vine Physiology
1:45 Fertility and Fertilizers
2:30 Canopy Management
3:30 Industry Updates (Viticulture Products and Services)
4:30 Welcome Reception and Exhibitor Showcase

Wednesday, March 24
8 AM Pest and Disease Mgmt
8 AM Disease and Nematode Management
8:45 Weed Identification / Control
9:30 Insect Pest Management
10:30 Vertebrates and Birds
11:15 Industry Updates (Pest Management)
Noon – Lunch (Exhibits Open)
1 PM Irrigation and Water Mgmt
1 PM Irrigation Scheduling Techniques
1:45 System Design and Evaluation
2:30 Water Use by Grapes
3:30 Physiology of vine/water relations
3:30 Industry Updates (Irrigation and Soil Moisture Monitoring)

Early registration fee is $199/person – before March 1, 2010. There are discounts for association members, and multiple people coming from same company: $179/person.

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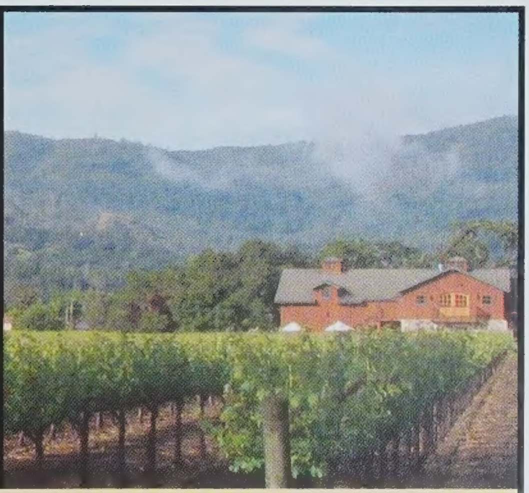

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